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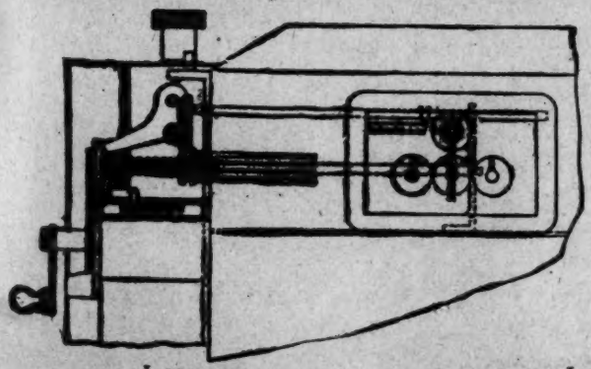

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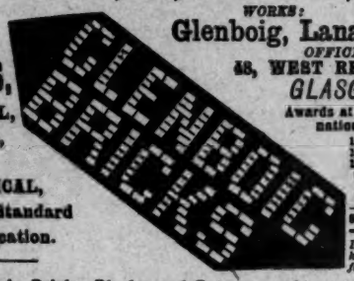

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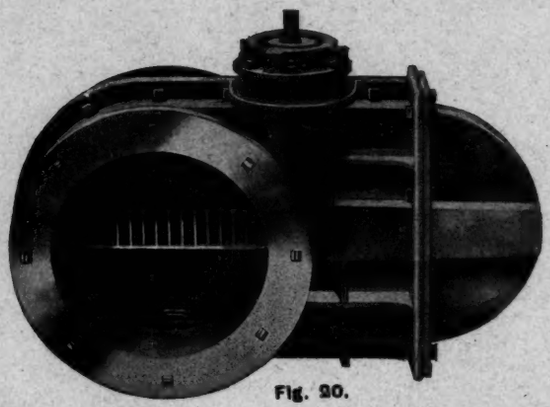

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VOL. CXXXIX., No. 2836.] TUESDAY, SEPTEMBER 18, 1917. [69TH YEAR.

EDITORIAL NOTES.

The Gas Undertakings Deserving Relief.

On high authority we were told the other week that "when "a member of the National Gas Council went to the Board "of Trade about this matter" [that is to say, relief for gas undertakings where war conditions have brought about serious oppression], "he was told that, inasmuch as the "sliding-scale was a bargain, they would have to ex- "amine into every case by itself, because each presented "its own individual conditions." Another high authority had previously said: "I do not see how we could expect "relief from Parliament while the war rages." The former authority also stated that he was certainly puzzled to know in what way the Board of Trade, in its present congested state, could take up the work of reviewing the "question "in every gas company in the kingdom. It was hopeless, "even if Parliament would sanction it." There appears to be want of imagination in these remarks. If such a want were present in the general conduct of the war on the part of the Allies, then the position of those fighting for right, honour, and the suppression of Prussian tyranny might as well be at once relinquished. The financial conditions of the gas industry have been dragged down from a high level to a low one; and nothing whatever has yet been done to stop the course of the flow. It is plain from the quoted remarks that what is wanted is a *modus operandi* for securing a *modus vivendi*. Last week we pointed out a means by which the Board of Trade could be relieved of the work; and an old precedent was quoted in support of the proposition. If *ad hoc* Referees or Commissioners were appointed, with the sanction of Parliament, to take the matter in hand, it could be easily accomplished.

There is now the second question to be considered, and that is as to whether the work that would confront the appointed body would be of such an extensive character that it would be impossible for the members to deal with it judicially. The authority whose remarks were first quoted said: "The "sliding-scale now existed almost universally." That is untrue if applied to companies, and not to capital. The sliding-scale now covers a considerable proportion of the privately-owned gas capital of the country through the Metropolitan and Suburban companies being included; but, taking the last-issued complete returns of the Board of Trade to December, 1913, there were 265 statutory gas companies working under the sliding-scale, and 253 (excluding the South Staffordshire Mond Gas Company) still under maximum prices. There is nearly an equal division, which is a different tale. There have been a few transfers from the maximum to the sliding-scale condition during the war years; but they would not make a considerable difference to the tale of the 1913 returns. The authority whom we have quoted went on to say that "the maximum or fixed "price companies were in a worse condition, for when they "exceeded their fixed price, they must go on selling at a "loss." These various statements constitute matter for investigation, and especially the last one, as much depends on the degree of the maximum price itself.

In regard to the sliding-scale companies, it is only those concerns with low standard prices that are first in need of relief; and the companies with the higher standard prices, unless extraordinary circumstances affect them, might not have, while the war lasts, to trouble any tribunal set up to grant relief until the circumstances of the sliding-scale can be investigated and legislated for under the new level of conditions which, succeeding the war, will be found to have entirely obliterated those that pre-existed, and particularly those that prevailed when the terms of the sliding-scale were originally arranged. Analyzing the standard prices of the 265 sliding-scale companies in the returns of 1913, one marvels at the great divergence in them, which divergence seems to have more relation to the period of time at which they were fixed than to those factors that are generally declared to come under the review of Select Committees in determining a fair standard price. Generally speaking, the higher the standard prices, the more remote their fixing from the times of harder working conditions; and it has only been progress in gas production and utilization and enlarged business that have enabled many low standard priced companies, with the increased costs for material, labour, and money, to arrive at the position they reached prior to the war. Some divergence is also found at the same period of time; but, from an intimate acquaintance with Parliamentary Committee room work, we are safe in saying that the factor that has had greatest effect in causing the divergence has been the cleverness of Counsel and of the expert consultants whom they have had in the witness chair to assist them. Otherwise, there is little reason to be detected in the differences of conditions as to why, in certain cases, "A" should have had in one session 4s. fixed as the standard price, while "B" only obtained (say) 2s. 6d. Then, very generally speaking, in later years, notwithstanding that the prices of material, labour, and money have been at a higher level, there has been a tendency for the standard price to slide downwards (compared with prior fixations) where there has been conversion from maximum to sliding-scale conditions.

However, it is not difficult to show that the members of a specially appointed body would not have a terribly imposing task in considering the question of temporary relief under the extraordinary circumstances of the time. They would naturally start their work from the lowest standard prices; and, beginning with York (which holds the record for lowness with 2s. 3d.), there are only 42 undertakings with standard prices up to 3s. 4d.; then 25 have standard prices of 3s. 6d.; and 33 between 3s. 7d. and 3s. 11d. In these figures we are not noticing special standards applying to outside districts; and in the few cases where there is a neutral zone the figure has been taken at which dividends would commence to decrease. Now up to 3s. 11d., 100 companies are concerned out of the 265 sliding-scale ones; and the capital represented by these 100 companies is an immense part of the total capital of private gas enterprise. There are only thirteen companies with maximum prices between 3s. and 3s. 9d.; and only three of them below 3s. 6d. There are thus 240 maximum price companies rejoicing in maxima from 4s. upwards. These figures show that, approaching the task from the lower standard prices and the maximum ones, a special tribunal would not by any means have an unwieldy proposition before it.

While we have the further results of our analysis at hand, we may, for the sake of the interest attaching to them, present them to our readers. In regard to the sliding-scale standard prices, no less than 154 companies have standards between 4s. and 5s. inclusive. The 4s. standard price leads with 41 companies; 4s. 1d. to 4s. 5d. follow with 35 companies; 4s. 6d. succeeds with 31 companies; 4s. 7d. to 4s. 11d. govern 24 companies; and 5s., 23 companies. The balance of the eleven companies have standard prices ranging from 5s. 2d. to 6s. 10d. Now between 4s. and 4s. 11d., we have 79 maximum price companies—making, with 13 below 4s., 92, and leaving no less than 161 companies with maximum prices from 5s. upwards. Therefore, on the whole number, the maximum price companies are considerably better off in these times than the sliding-scale companies. Putting the

figures for the maximum price companies in greater detail, there are 19 companies with a maximum price of 4s.; 9 between 4s. 1d. and 4s. 5d.; 34 with 4s. 6d.; 17 between 4s. 7d. and 4s. 11d.; 65 with 5s.; 14 between 5s. 1d. and 5s. 5d; 25 with 5s. 6d.; 16 between 5s. 7d. and 5s. 11d.; 20 with 6s.; and 21 between 6s. 1d. and 8s. 4d.

The figures demonstrate that, with the exception of a few maximum-price companies, there are a larger number of sliding-scale companies that should have early relief, but yet not such a number that the task would be too great for a special tribunal to handle. There is no reason why the share and stock holders of the high standard and maximum price companies should be in a preferential position in these exceptional times. It is their good legislative fortune that they are so, and not owing to individual merit. Another thing that our analysis shows is that the standard prices have largely been fixed at levels lower than the maximum prices; so that shrinkage of standard dividends commences early, while with maximum price companies there is no shrinkage of maximum dividends so long as the maximum price will provide, with reserves, sufficient money to pay them. It may be suggested that the lower standard dividends have in some cases been fixed owing to the better profit-earning power of the companies. This may apply in normal times to some of the companies—not to all. Some of the good profit-earning companies of pre-war times are to-day paying five to six times more for the sea carriage of their coal than in peace times. Reiteration may be given, in conclusion, to a point made on other occasions, that, unless a profit can be earned which will pay a fair interest on the capital employed, then the consumers are not paying the actual costs of production. It was seen last week [p. 457] that the price of gas in Berlin is to be raised from the equivalent of 4s. 6d. to 5s. 8d. per 1000 c.ft.; and, as it is accounted there in these days a merit to be a small consumer, the charge to prepayment and other small consumers, using less than 365 c.m. per annum, is to be 5s. 1d. per 1000 c.ft.

Gas Council or Advisory Committee for Scotland.

Now that we have before us the full report of the discussion at the North British Association meeting on the proposed Scottish Gas Council, it cannot be said that we are altogether pleased with its general tone. In it is discerned a division of opinion, an ill-concealed antagonism to the National Gas Council, and, despite protests to the contrary of those who think rationally and see ahead, there is in some quarters an evident disposition to detach Scotland from the National Council, and proceed independently of it. Those who are wise, and have regard for the gas interests of Scotland, will see to it that the extremists do not work their way, but that moderation is allowed to prevail. There is manifest dissatisfaction with the representation of Scotland upon and by bodies with headquarters in London; and it would be well to inquire into the cause of this, as a preliminary to anything else being done. Mr. Alex. Wilson, we think, put his finger upon the trouble, when he said he thought its root was to be found in the modicum of representation of Scotland on the Council of the Institution of Gas Engineers, with the consequent attenuated representation on the National Gas Council. Now if this be so, whose fault is it, and what should be done? The fault is that of Scotland, in contributing such a small membership to the Institution. And what should first be done is to make an attack on the root of the trouble, so that Scotland could command a better representation at the very hub of the work of the gas industry, for that is where Scotland must be, and not away or separate from it, if it is to achieve for itself the best and most enduring results.

Though there is a division of opinion as to the necessity for the formation of a Scottish Gas Council, the project has undoubtedly a large following; and it is patent that the following is strong enough to effect its purpose, whether or not the result will be to the ultimate advantage of the gas undertakings of Scotland. The President of the North British Association (Mr. John Lang), and Mr. J. W. Napier, who has been prime mover in the matter, are both of opinion that Scotland requires a body of its own; for, in their view, there is plenty of work that is individual to itself. But these and some of the other speakers disclaimed all intention of opposition to the National Gas Council—asserting that the Scottish Council should work collaterally or in conjunction with the national body. The disavowal on the part of certain speakers of any intention to bring about even the semblance of opposition to, or separation from, the national body must be accepted, because we believe that these Scottish friends are acting in perfect good faith, with the conviction that what they are contemplating is the best possible for their undertakings. But their reticence in displaying any disposition to depart from even the appellation chosen for their Council is not the best evidence that could be presented by them of a desire to work conjunctively with, rather than independently of, the national organization. What would be the tendency of having one body with the title of the "National Gas Council" and another called the "Scottish "Gas Council"? Separation, and independent action! What would be the idea that would be present in the minds of outsiders who were brought into contact with these two titles, without the position being fully explained to them? That there were two bodies—the one aspiring to national representation, but such representation impaired by the existence of the Scottish organization, with its relatively limited territorial power and influence. Without a modification of their attitude, we can see the promoters of this scheme for Scotland producing disintegration, and a weakening of the power of the larger national body; and the whole gas industry will be the sufferers—the Scottish gas undertakings included. We say it seriously, and with all respect for our Scottish friends, that even the semblance of division or an aspiration to equality on the part of Scotland, will do infinite harm to the recognition that the National Gas Council has already attained, and will do no good to Scotland. We regret exceedingly to see the remarks made by Mr. William Wilson in speaking of the "opposition" of the National Gas Council to the scheme, which he interpreted as showing that the central body "were afraid that Scotland "would detract from the standing of the Council if she dared "to elect a similar body of her own;" and further, "if "the National Gas Council cared to extend a hand and "help them in a brotherly way, then they in Scotland would "accept their assistance, but they did not altogether relish "the suggestion of being mothered." These remarks do not appeal to us as being diplomatic; they are certainly not founded on unity; and they rather suggest jealousy. The National Gas Council is constituted of men who give their work voluntarily; and whatever fear they have of any appearance of separation is due not to any lowering of the standing of the Council, but to the detrimental effect upon the whole industry. In this detrimental effect, a prudent consideration should satisfy, Scotland will assuredly participate.

We quite admit that gas matters do arise for deliberation and settlement that are peculiar to Scotland; but these questions are in minor part to those affecting the larger general policy which can best be handled by one body representative of the whole industry. We have considered carefully what Mr. Napier had to urge upon this particular aspect of the matter—that is to say, questions individual to Scotland—which alone can give any justification for the appointment of a body to be known as the Scottish Gas Council. And nothing can be seen that justifies anything more than a special body whose functions should be advisory and consultative, and whose action should be through the national organization. The suggestion as it is presented indicates that Scotland wishes "to paddle its own canoe," while not forfeiting anything that can be gained through the paddling of the national canoe by the National Council. Anyway, if the proposed body is persisted in, it must result in a modified adhesion to the National Council upon the part of Scotland; while a Scottish Advisory or Consultative Committee could be of valuable help to the latter in view of the geographical position of Scotland, and the legislative differences that, it is admitted, do exist. A Committee has been appointed to consider the matter, to formulate the details, and to submit their plan at another meeting of the Association. They are entering upon their work with the claim for a "Scottish Gas Council" set firmly before them. Fervently, we appeal to them to consider with care whether or not such a body, with such a name, is desirable, and whether there is any probability if formed that it can fulfil any really useful purpose apart from being advisory and consultative. If it is believed that it cannot, then let the recommendation that goes to the Association be a modification of current aspiration. Government Departments were at one time always complaining of the divided representation of the gas industry. They did not know to which body to go; they did not know which was the correct body to hear in respect of any particular matter.

Whatever Scotland does, the Government Departments will (now that they have become accustomed to dealing with the National Gas Council) still go to it, and still expect to be addressed by it. They will not want any return, even partially, to the old unsatisfactory conditions. If there is any choice between hearing the National Gas Council and the Scottish Gas Council, they will turn to the body they know, and not to the newer body, brought into existence—for what purpose or reason? It is a matter over which there should be hesitation before making a move, lest the drastic remedy for what is considered to be the insufficient representation of Scotland lets Scotland down still further, and coincidently damages, in quarters where it is most important, the representation of the whole industry.

Indirect Profiteering in Coal.

A SHORT time ago correspondents and ourselves were freely calling attention to the scandalous percentage of inert material that was being distributed by collieries as coal. This appears to have become a general practice—the excuse being the delay that picking causes to the despatch of coal-wagons from the collieries. Whether the gain in time is equivalent to the (say) 10 to 12 p.ct. reduction occasioned in the coal-carrying capacity of the wagons through the increased percentage of inert material, we deliberately doubt; but certain it is that the more expeditious despatch of the coal-wagons containing the large excess of valueless material is no compensation for the accumulation of uneconomy that the distribution of such material spreads throughout the land. In the gas industry alone, a 10 p.ct. increase of inert material means on the consumption of (say) 18 million tons of coal per annum, 1,800,000 tons excess of useless material that has to be carried and delivered; and it further means that coal to the extent that this quantity causes a deficiency in the genuine manufacturing material has to be purchased to counterpoise it, and in order to meet the demands for gas and other products. This extra coal has to be transported by sea or by rail. In other words, while the Coal Controller has been exercising his wits in devising schemes for the curtailment of railway traffic, the collieries have been exercising theirs in the contrary direction, by indirectly causing the requirement of (say) from 10 to 12 p.ct. greater home sale of coal through the dirty condition of that sold. For the gas industry, this large bulk of inert material means not only loss through additional purchase, conveyance, and handling, but loss through the reduced carbonizing capacity of the retorts, through, too, the lowering of the yield of gas and other secondary products per ton, through also the increase of the fuel account, the reduction of furnace efficiency, and the labour in keeping furnaces clean. The industry has a very strong case against a condition of things that does not improve, through the disinclination to say much with the needs and difficulties of next winter rising so threateningly from its immediate landscape.

But the uneconomy of this condition is cumulative; and it is therefore essentially a matter for the Government and the Coal Controller to end as promptly as possible. The national loss occasioned through so simple a matter is a perfect disgrace. Hence the reason that Mr. John West, in our "Correspondence" columns, urges that gas undertakings should make a united stand against the "imposition" that this additional inert material represents. He speaks of one coal which he has had under investigation, which before the war contained 5 p.ct. of ash, and is now delivered containing 13·8 p.ct. of rubbish. By 2 or 3 p.ct. Mr. West, in his example, is in luck's way, compared with certain other gas undertakings. But quiescence has never yet supplied the road to redress or reform. He therefore thinks the industry should in combination insist upon a simple piece of work of such imposing economical result being performed—work which can be well undertaken by women. He uses the word "imposition." The expression is largely consistent with the facts. The Coal Controller insists on the conditions of the Price of Coal Limitation Act being complied with; and he has defined the profit per ton for coal factors and merchants. But are the decrees of the Price of Coal Limitation Act truly complied with by the sale of (say) an additional 10 p.ct. of valueless material? Our answer is distinctly in the negative. The protection intended by the Act against an undue increase of price is largely neutralized by what some collieries are doing in selling as genuine coal millions of tons per annum of inert material; and, according to some reports, the shifting of contracts under the Coal Controller's redistribution scheme promises to produce some unpleasant experiences of the raising of the proportion of unproductive material. If there is further laxity on the part of collieries in this direction, there is going to be an addition to the excess which the collieries are indirectly drawing from consumers beyond the 4s. limit per ton.

This is obvious. Take a coal that formerly contained between 5 and 6 p.ct. of ash, and assume for argument that it cost at the pit 12s. a ton in 1913-14. Some such coal now contains between 15 and 16 p.ct. of inert material, and the contract price at the pit is (say) 16s. The increase of the unproductive material by 10 p.ct. means that the collieries are being paid 16s. for 0·9 ton of material equal in quality to that formerly supplied, and so are securing 4s. per ton extra *plus* 10 p.ct. of the 16s., or 1s. 7·2d., for the increased unproductive material. So that for the coal (*quâ* coal) actually supplied, the colliery is receiving 5s. 7·2d., instead of 4s. The imposition does not stop there. The cost of picking is saved; and the purchaser has to further patronize the colliery to the extent of the loss of production occasioned by the extra percentage of refuse. The Act overlooked the penalizing of purchasers by artifice, for which the lame excuse of wagon delay is put forward, though wagon capacity waste is, at the present time, far more important to the country.

New Coal Price Instructions.

COAL sellers and buyers are having a restless time; but it is hoped that what is now being done will mean a period of peace till the next contract season comes round, and then possibly, if the war is still in full swing, "repeat orders" will suffice. Instructions were issued last week by the Coal Controller, Mr. Guy Calthrop, as to the prices of coal under contracts, including the abrogation of all contracts, so far as prices are concerned (but not deliveries) as from the 10th inst., in order that they may be revised, according to the instructions, and be given current legal exactitude. Some coal buyers will be grateful; others will not be. Those who are will be those who will materially benefit; but those coal sellers who have to shed part of their contract prices will be correspondingly ungrateful. It is impossible to content all. But Mr. Guy Calthrop, as Coal Controller, is evidently the right man in the right place. He is diplomatic. He prefaces the present sweeping instructions by telling the colliery owners what conscientious men, in the main, they have been in complying with the Price of Coal Limitation Act. There is no room for any charge of profiteering against the great body of them. There are cases where there have been prices in excess of the allowances under the Act; but, where the excess is small, it is quite probable that it is simply due to variations in the interpretation of the terms of the Act, though he cannot say that this applies to all cases.

But it will strike the average man that, if comparatively few contracts were concerned, there would be no need for so drastic a move as the cancellation of the whole of the contract prices in order to secure accurate alignment with the Act. Judging from the character of the instructions, the Coal Controller knows more than he admits in black and white. He is probably as much aware as we are that there are a good many cases of buyers who, while they have cause of complaint, have not complained, feeling that the excess price had better be tolerated than risk any trouble in the delivery of coal. He also apparently knows, as he has legislated for such stratagem, that there are collieries that have refused to make contracts with old customers, in order to obtain better prices from those with whom they have not previously made contracts, or by selling in the open market. It is really remarkable how comparatively small is the professed knowledge of the Coal Controller as to any unrighteous acts or artifices to evade the Act on the part of the colliery owners, but how well he has compassed them all in his new instructions, which we quote *in extenso* in this issue. Another feature that will be observed is that the Controller has followed the constructions put by the Board of Trade upon the main provisions of the Act. For one example, the corresponding prices forming the basis of contracts are to be those actually agreed in the year 1913-14, and not the prices made before July 1, 1913, for coal delivered up to June 30, 1914. Again, it is not obligatory that the corresponding contracts should have been with the purchaser. This would be impossible in numerous cases under the coal redistribution scheme. So long as the conditions have fair correspondence, or are the nearest approach to those of the new contract, that is all that is required,

subject to certain conditions. Purchasers of coal by contract must not neglect to find room immediately in their already well-stuffed minds for these fresh instructions, as they cannot now infringe the Act by paying more than their legal due for coal, any more than the seller may do so by charging more than the prescribed amount. The Act commands respect from both purchaser and seller; and the Coal Controller intends to see that there is obedience.

Tar Favours to Come.

Despite the work that is being done by the gas industry for the nation, and the heavy demand by the Government for tar products (payment for which is made on an ungenerous scale), a weak spot in the revenue for secondary products is tar. No chairman of a gas company in dealing with tar at a meeting of stockholders has, at the present time, a particularly kind word to say for it; and he passes over it slightingly, just as over the Government controlled sulphate of ammonia, which is also reluctant in disclosing any signs of the generosity which is meted out to other industries engaged on war work. Of course, pitch exportation has been practically impossible; and there has not been the same absorption of tar in various directions that existed prior to the war. The seventh annual report of the Road Board reveals this in connection with the work over which the authority presides. At present, its work is light compared with what it has been, and with what it will be later on through the wear and tear on roads, directly or indirectly attributable to the war, and the revelations that have been made as to the necessity for (as early as possible) a large reconstruction of main roads, with the view of meeting the increasing motor traffic, the wearing and vibratory actions of which upon the roads are altogether different from the old steady-going horse traffic. Stronger roads are now needed, and the increased cost of these roads will mean that greater care will afterwards have to be taken of their surfaces. While the gas industry does not feel exceedingly glad over the present demand for pitch and dehydrated tar for road purposes, it can at any rate look forward to the considerable promise there is for these commodities in future road reconstruction, repair, and upkeep. Pitch will be largely required as a binder in the remaking of roads in the more robust style required by modern traffic; and tar will be considerably applied in resurfacing work. The after-war outlook is good in these directions. But the present does not show any improvement. The Board announce that during the current year they are distributing, with Treasury sanction, the sum of £200,000 out of the Road Improvement Fund, principally in the form of assistance for the tar treatment of main county roads, which are in a suitable condition for such treatment. By this means something is being done to secure the preservation of roads that were improved prior to the war. But the £200,000 does not mean this sum spent on tar alone. It has to be spread over all the expenses attached to tar treatment; and what is the tar absorption power of £200,000, in comparison with the volume of dehydrated tar produced from the millions of tons of coal carbonized by the gas and coking industries?

Back to Longer Lighting Hours.

We all put back by one hour our clocks and watches before going to bed on Sunday night, though the official time for doing this was not until three o'clock in the morning. The change will at once effect a difference to the draft for lighting purposes upon the mains of gas undertakings, which have not by any means had any cause this year to regret the existence of the Summer Time Act—in fact, they have been pleased to have its friendly aid in the circumstances of the times. Those people who revel in statistics as one of the most entertaining features of our mundane existence will have some difficulty in effecting any computation as to the economy to the country of the saving of lighting gas owing to the extension of evening time by one hour. At best, the result could only be guesswork; for the sales of gas during the summer time have this year been greater than ever, notwithstanding the shortened use by one hour for lighting. Comparison being made with last year when daylight saving was also the rule, we have before us increases of consumption ranging for different undertakings during the summer months between 5 and 6 p.ct. up to 17 p.ct. Other figures not in our possession might carry the increase higher still. Such percentage augmentations wholly obliterate the economy effected in lighting. To ascertain the cause of the increase does not require any particularly acute penetration. Householders have during the summer time simply been shifting more than usual the obligation for providing them with heat for domestic purposes from their own shoulders to those of the gas purveyors; they have also been helping the Coal Controller and coal merchants in respect of the coming winter's pressure, by the frugal use of such coal as they could obtain and could store away in their cellars; some, too, may have hearkened to, and acted upon, the appeal of Ministry of Munitions to use more gas. There are various causes for this summer time increase of gas consumption. But it will all do good. Reliance upon the gas-mains during war-time will promote reliance upon them when the war is over. It will all help to suppress the irrational use of coal and to promote its rational use. And that is one of the things that is to serve in the economic development of the country. If gas undertakings had had an extra hour's lighting on top of the excellent increase of summer time consumption, well they would not have been able to stock their coal stores quite to the same extent as they have done in anticipation of a difficult winter.

Employment of Women in Gas-Works.

Useful information, brought right up to date, is furnished by the second edition of a series of pamphlets, prepared by the Home Office and the Board of Trade on the subject of the substitution of women in industry for enlisted men. Readers of the "JOURNAL" have had numberless opportunities of learning, from those responsible for the management of gas undertakings, what is already being done in this connection; and the particulars thus published from time to time have made a very excellent showing. But no doubt, in certain directions, it is possible for still more to be accomplished in this way; and that is the justification for the re-issue of the pamphlets giving the results of the further developments which have taken place since the first edition made its appearance last year. The series is a lengthy one, consisting of 27 pamphlets; and the contents of that relating specially to gas-works are reproduced in the news columns of this issue. A study of this will prove suggestive to managers who may not yet have taken full advantage of the possibilities of female labour. In the pamphlet, emphasis is laid upon the fact that, "in the interests of the nation, it is of vital importance that every manufacturer who is producing articles required for the prosecution of the war, for the support of the population, or for the export trade, should make every effort to maintain his business at the highest possible pitch." The efforts which gas undertakings have had to make to this end have been of a far wider character than is involved merely in the substitution of women for enlisted men.

Coal Gas for Motor Cars after the War.

In a short reference, in our news columns, to coal gas as an alternative to petrol, the remark appears: "It is argued that coal gas will be dropped after the war, or as soon as the price of petrol comes down. That may be a long time yet." There is room for doubt as to whether coal gas will receive summary eviction for this purpose after the war, or as soon as the price of petrol comes down. Much, of course, depends upon the latter event, and its extent. But we are a little dubious as to the price of petrol making a heavy decline immediately after the war. Of course, there will be more tank-steamers available than there are to-day for the general trade in petroleum and its products; but there will be hundreds of thousands of motor cars of all descriptions, new and old, all waiting to commence the absorption of petro or some other motor spirit, and their number will grow at the unprecedented rate at which car manufacturers of the world will then be able to turn them out. During the war America has been making cars in number that has had an important effect on the demand for petrol. Simultaneously the rate of motor spirit production has not (this quite apart from the shipping question) been keeping pace with the growth in the rate of the world's demand, nor is there any prospect of such a condition, calculating from known data. Thus it is not at all likely the price of petrol will decline to pre-war rates; the probability rather being that there will first of all be a fairly substantial drop, and then, as the demand grows, it will make an ascent which will give advantage to other motor fuels. For this and another reason, we do not

think that coal gas will after the war be entirely dispensed with as a motor fuel. The other reason is that brains are busy on the problem of constructing light metal containers which will carry gas at a fairly considerable pressure. If these can be developed —with coal gas showing an appreciable reduction of fuel cost per mile or per ton-mile compared with petrol at normal prices—users of, at any rate, trading cars will be looking at the matter not from the æsthetic point of view, but from that of £ s. d. War experiences have proved that coal gas leads in lowness of fuel cost for motor purposes, and this will be a big consideration with the man of business.

Gas-Container Connections.

Those who are interesting themselves in the making and fitting of flexible or other gas-containers for motor-car use, as well as purveyors of gas, are asked to give special attention to the letter in our "Correspondence" columns by Mr. Leo. Swain, the Chairman of the Manchester, Liverpool, and District C.M.U.A. He finds that all sizes of connections are being used for the gas-containers now being supplied for motor vehicles. That is a great pity. There must be a universal standard, in order that trouble may be saved and expeditious filling assured wherever a car may be. He suggests, too, quotations for gas for this purpose at per 100 c.ft.; and there is no difficulty about this. Another point which would save time would be the marking of containers with their capacity, as attested by a gas undertaking, so as to avoid measurement and the reading of a meter every time a container requires refilling. This is a new business; and we may as well get on to an economical basis for business transactions as early as possible.

PERSONAL.

Mr. JAMES WOODS has been appointed Manager of the Clones (co. Monaghan) Gas-Works, in place of Mr. EDWIN DAVIES, who has accepted the managership of the Cavan Gas-Works.

Mr. D. MACINTYRE, of Dundee, has been unanimously appointed Engineer and Secretary to the Montrose Gas Light Company. Mr. Macintyre succeeds Mr. JAMES MITCHELL, who is now Chief Assistant at Dundee.

It is, says "The Times," understood that Sir ARTHUR STEEL-MAITLAND, Under-Secretary for the Colonies, will be the Parliamentary Secretary of the new Department [to which reference was made on p. 456 of last week's issue] that is being created to improve the existing commercial intelligence system.

On reaching the age-limit next month, Sir ARTHUR WHITELEGGE, K.C.B., who has held the appointment of Chief Inspector of Factories and Workshops at the Home Office for more than 21 years, will retire; and the Home Secretary has appointed Mr. H. M. ROBINSON, the Senior Deputy Chief Inspector, to succeed him. An arrangement has been made by which Sir Arthur Whitelegge will continue to give his services to the Factory Department in an advisory capacity on questions of a technical and scientific character.

Three weeks ago, we had to record the death in action of Mr. STANLEY EDWARD PILBROW, of the R.F.C., the second son of Mr. Edward Pilbrow, Inspector in charge of the Westminster Office of the Gas Light and Coke Company. Mr. Pilbrow's bravery and splendid behaviour generally were, it will be remembered, testified to by those who knew him at the front; and now we are pleased to learn that his father has had the gratification of being informed that, in addition to being graded a Qualified Ariel Gunner the day before his death, his son was awarded the Military Medal earlier the same month.

Obituary.—Alderman Alexander Gillies, the "father" of the Gateshead Town Council, who died last week in his 96th year, was for a long period a Director of the South Shields Gas Company.

Eastern Counties Gas Managers' Association.—In addition to the discussion on "War-Time Experiences of Gas-Works" to be opened by the new President (Mr. J. H. Brearley, of Longwood) at the autumn meeting of the Association on Friday of next week, there is some formal business to be transacted. Communications will also be considered from the Midland Association of Gas Engineers and Managers and the Wales and Monmouthshire District Institution of Gas Engineers and Managers with reference to "The Representation of the Gas Industry on the Coal and Coke Supplies Committee" and the "Schedule of Protected Occupations and Gas Undertakings." The meeting will be held [on Sept. 28] in the Queen's Room at the Holborn Restaurant; and at the close of the meeting tea will be served to members and visitors. The chair will be taken at 2 p.m. by the retiring President (Mr. J. Terrace, of Grimsby).

ELECTRICITY SUPPLY MEMORANDA.

IT seems possible that electricity supply administrators and engineers will become divided into two parties over the character of the great scheme that is expected to electrically regenerate the country. As we have pointed out before, there is a decided tendency among the municipalities not to relinquish their privileges, if they can possibly avoid it, and the companies have no intention of voluntarily stepping into a condition of things that may place them in the power of the municipalities, or in that of any board or organization that is built up with a preponderance of municipal representation in its constitution. On the other hand, there are those who are not negligible who are looking to the large ideals that compass the establishment of some central regulating authority, the creation of extensive generating stations, and the saturation of the country with cheap electricity, which is not alone to be done by more economical generating costs. The Electrical Correspondent of the "Times Engineering Supplement" is not particularly enamoured of the scheme that has been hatched by the Lancashire and Cheshire Committee, with its interlinking, its Joint Board, and its District Board features. He belongs to the school with the higher ideals. He concedes that it is to the credit of the Committee that they are conscious of the deficiencies of the present systems; but he regrets that they have not risen to the dignified state that would allow them in the national interest to abandon local privilege. This appears to be their sin in the eyes of the writer in "The Times;" but his opinion and his generalities are not conclusive evidence that the Committee are wrong and that he is right. He has his eyes fixed upon a revolution; they on starting from existent conditions, and working-up to a new state. The latter can hardly be questioned on the score of being the more economic course. But the scheme is accused of showing conflict between self-interest, local interest, and national interest. May it not be that in the long run it would better serve the end than prematurely laying capital to waste, and creating an immense fresh capital obligation. The municipalities and supply companies are told by the Electrical Correspondent that it does not matter much what they choose to think or propose; the reform which is to give the nation what it requires in the shape of cheap units cannot be left to them. It is the right of the nation that it should obtain electricity on terms proportionate to the national capabilities of electrical generation and transmission. Admitted; but that does not settle the question of the right scheme to attain the end. However, the critic would like to see the electrical conditions of London under practical consideration; and then, with the North-East Coast already admirably provided for, and the Lancashire and Cheshire supply authorities properly burdened with a sense of deficiency, "the situation may yet be saved in time for the period of fierce international competition that will, in the opinion of many judges, follow the temporary post-war boom." The days of miracles are unfortunately in the deep past.

High Ideals.

It shows how general are the optimistic views regarding the future that from both the electricity and the gas industries (which are in a good position to test local and other tendencies) there burst forth here, there, and everywhere fervent expressions of confidence as to the large part they are going to have in the coming reconstruction and development of the country's industry and trading. It is perfectly clear that this is so in relation to the gas industry, seeing that various other industries will be absolutely dependent for their expansion upon that of the work of the gas industry in the matter of swelling its output of secondary products, and that, for heating of all kinds and concentrated power purposes, gas and coke will be in considerable and growing demand. The electricity industry looks to power for its greatest opportunities; and all over the country electrical engineers are hoping to get a slice of the expected new business. Naturally this anticipation has been most evident in the crowded industrial areas; but it is also seen in areas where large industrial factories are not so numerous. At Maidstone, for instance, where the hop and paper industries flourish, the Corporation Electrical Engineer (Mr. E. E. Hoadley) has robust views on the subject. While the last financial year held for him considerable difficulties, he found in it some healthy compensations. He believes, for instance, that the general public has at last realized the many and solid advantages that electricity possesses in fields other than lighting. The Government, too, has awakened to the fact that cheap and ample supplies of electricity are absolutely essential to national development and recuperation, and to the great expansion that will be embarked upon when peace is again established. Mr. Hoadley does not, in his annual report, tell the Council and the ratepayers that it is owing to the past technical deficiencies of the electrical industry that the Government, through the Board of Trade, are now inquiring into plans for improving the electricity supply systems of the country, and that the technical side of the industry is now itself in an unprecedented state of ebullition over the question as to what is best to be done. The electrical position is in a state of flux just now. But it does not matter; it has come to the point where there is agreement that something has to be done that will be better far than the past. However, Mr. Hoadley rejoices. The Maidstone

Confidence.

Electricity Department is going to share in the glorious new harvest, as several large firms have arranged to purchase the whole of their power from the mains of the Corporation. Mentioning this, Mr. Hoadley takes the opportunity of polishing-up for the inspection of his councillors the approved policy of gas and electrical engineers. It is that the greatest service that the supply authorities can render to the community, after making their undertakings commercially sound, is to give it cheap supplies of energy, and not to make large profits to go to the relief of the rates. There are some things in which there is striking accord between gas and electricity people.

Meteor's Logic.

Occasionally there are others over which such accord does not exist. "Meteor" recently had something to say about the little piece of absurdity published in one of the evening papers as to the prospective appointment of a Gas Controller; and we made a few remarks regarding "Meteor's" reference to the matter. These were not to "Meteor's" liking. We drew from what he had to say a very logical conclusion, which he is now pleased to allude to as an "astonishing paragraph." It was as follows: "There may be pacifists and other conscientious objectors. 'Meteor' points out that the pacifists are in a predicament. If they save coal or if they consume gas, they are assisting to win the war and defeat their German friends. Every consumer the electrical industry entices away from the gas industry at the present juncture is an assistance to the enemy; so that those electricity managers and salesmen responsible for such enticement are worse than the avowed pacifists. It is not a gas controller that is wanted, but an electricity controller." On this "Meteor" remarks: "Let us carry our critic's advice to its logical conclusion; let us imagine for one moment that gas displaces electricity *passim*. Even electric-motors in gas-works must go. The munition factories shall drive their lathes and drills and milling machines by gas, the lifts shall carry their freights by the same motive power, the searchlights shall be gas arcs, the thousand and one applications of the electric motor shall become gaseous. Could the war continue for seven days?" Only asses as big as those electricians who used to cry out for, or predict, the rapid extinction of the gas industry would regard as a "logical conclusion" such an argument. It is pseudo logic not mixed with reason.

Electrical Contractors take Advantage.

When the Government sought the assistance of the gas industry in saving the country by the rapid supply of materials for high explosives production, the Ministry of Munitions made it perfectly clear to local authorities that not by tests, legal actions for deficiency, publication, or in any other manner were they to notice deficiencies from standard qualities which would in any way injure the business of gas undertakings, seeing that the deficiency would be occasioned by the work that was being done for the success of the nation in the war. We have looked upon Mr. A. H. Seabrook, the chief of the Marylebone Electricity Department, as being too good a sportsman to take advantage of any temporary deficiency of gas quality in injuring the business of his competitor, or in attempting to defame it in any way in current circumstances. This belief we have no evidence to think need be altered, so far as he is personally concerned. But, on the other hand, we cannot shut our eyes to the fact that there are electrical men who are prepared—some secretly—to utilize the nationally-created difficulties of the gas industry so as to gain business advantage. There are also certain electric papers that are not at all loth to give, directly or indirectly, publicity to a comparatively small drop in the heating value of gas, in order that the electricity industry shall materially benefit therefrom. The attention of the Ministry of Munition ought at once to be called to the manner in which the gas industry's business is caused to suffer through the operations of competitors who have no compunction whatever in utilizing the effects of the national work of the former for the advancement of their own interests. In the "Electrical Times" the other day, there appeared a description of an electric-cooking installation that has been made on the premises of Messrs. G. Cozens and Co., of Edgware Road, though the gas and steam apparatus has not yet been disconnected, probably for safety, as electricity and the equipment have a notorious propensity for failure just at the wrong time. It is stated that the Managing-Director of the firm (Mr. F. B. Wilkinson) casually informed Messrs. Locke and Soares, who were carrying out electrical work on the premises, that there had been difficulty in preparing the meals for the staff owing to "several causes." Shortage of coal for one thing made it troublesome to maintain the steam supply; labour difficulties made it difficult to maintain continuity of supply, even if the fuel were available; and then (so the "Electrical Times" asserts) "the quality of the gas had deteriorated very materially during the last year or two, so that it was only with difficulty the cooking could be carried out."

An Alleged "Material" Decrease in the Thermal Value of Gas.

The fact that the statement as to the quality of the gas is put last in the list indicates that its so-called "material" deterioration was the smallest difficulty of all; and this is confirmed by the further statement that, prior to the conversation with a representative of Messrs. Locke and Soares, Mr. Wilkinson had intended "to place an order with the Gas Light and Coke Company for gas-heated apparatus to replace that previously heated by steam." But then "Mr. Soares pointed out the advantages of electrical operation." We should much like to have a faithful account of what was said on the occasion. Now the fact that during war time some of the largest hotels, restaurants, and clubs in London do all their cooking to time and to the satisfaction of their clients—in many cases considerably more per establishment than Messrs. Cozens and Co. have to cater for—by gas supplied from the mains of the Gas Light and Coke Company shows that there is not much to be said against the quality of the gas. Moreover, the work that is being done by the Company for the Government, while to some extent divesting the gas of the constituents that give luminosity to an open gas-flame, only diminish to a negligible percentage, as independent official records prove, the calorific power of the gas. In the circumstances, what does the "Electrical Times" really mean by the published assertion that "the quality of the gas had deteriorated *very materially* during the last year or two, so that it was only with difficulty that cooking could be carried out." Is this a statement that can be defended? Is it a statement that ought to be published either as a matter of fact (in face of the official testings) or in fairness, in view of the depreciation, such as it is, being due to the supply of high explosives to our forces, and in view, too, of the instructions in the matter given to all local authorities in order to defend the gas industry? Is it a condition that justifies a diversion of business from the gas company at the present time? Even now less than 7 c.ft. of gas will give more British thermal units than the electrical unit, which has only a value of 3420 B.Th.U.! Small wonder the Marylebone Electricity Department are only charging Messrs. Cozens 0·5d. per unit for cooking purposes; and this with war time producing costs prevailing. It tells a tale of need in comparison with the heating value given by gas. The report also states that the Marylebone Electricity Department has run-in a special three-wire direct current service for the cooking supply. This, with all the adjuncts, must have cost a pretty penny. Who paid for this? If the department (which has been raising its prices to ordinary consumers), is the cost covered by the 0·5d. per unit? We know that some extraordinary things have been done by the electrical people in order to get a footing in the cooking business with the low thermal valued electrical unit, the slowness of operation, and the uncertainty. Mr. Wilkinson appears to have been duly informed as to the fable of the greater wastage of meat by gas operation than by electrical. Perhaps his own common sense has since suggested to him the question: Given the use of the same temperature in a gas and an electric oven, the same length of time for the cooking, and the same weight and constitution of joint, why should there be any difference in the weight of the cooked meat? Perhaps, too, his own commonsense has induced the question as to whether, if B.Th.U. cost so much less by gas than by electricity, it is posssible for all the work that has to be done on the hot-plate in the way of boiling operations to be carried out as cheaply and as quickly by electricity as by gas?

A Sign of the Times.

With the demand for energy for munition production, there are electricity undertakings that are much pushed for generating power, and are not likely to get more until after the war. There are other undertakings that wish they were pushed by demand, but they are not. The only thing by which they are pushed is the problem as to how to make both ends meet, and that problem they have not been able to solve. The curbs on unnecessary capital expenditure, the labour difficulties, the expenses of material, and the troubles over fuel supplies have each and all contributed to bringing some electricity undertakings, as has been the case with gas undertakings, into a condition where it is impossible without danger to do more business at times of maximum demand than that already provided for. Several gas undertakings have had, much to their regret, to make a firm refusal to the request for the fixing of more gas cooking-stoves and gas-fires, solely on account of the possible use of connections already having at periods of maximum demand outstripped plant capacity. But we do not know the case of a gas undertaking (this probably owing to the advantage due to storage) that has yet come to the position in which it has had to contemplate the disconnection of "non-essential" consumers. The Cheltenham Corporation Electricity Department is in this position. According to an electrical contemporary, the Committee have decided to apply to the Board of Trade for sanction, under the Board's regulations, to disconnect classes of non-essential consumers in cases of necessity, in order to enable the supply to be continued to essential consumers.

Prices of Superphosphate.—The War Cabinet have fixed maximum prices for the sale of superphosphate in the United Kingdom on the basis of a delivered price of £6 5s. for 28 p.ct grade, if delivered in December, with a reduction of 1s. per month before December and 1s. per month rise from January until May, 1918. Therefore, 30 p.ct. superphosphate costs £6 10s. From 30 p.ct. downwards, there is 2s. 6d. per ton reduction for each complete unit; from 30 p.ct. upwards, an extra 4s. for each complete unit. Prices are for net prompt cash, in makers' or vendors' bags, delivered by rail or water to consumer's neares railway station or wharf. An order to this effect has been issued by the Ministry of Munitions; and a circular explaining its provisions can be obtained from the Food Production Department.

JOURNAL OF THE INSTITUTE OF METALS.

THE fact that this week at the autumn gathering of the Institute of Metals part of the proceedings will bear upon the use of gas for melting purposes, will serve to remind of the annual general meeting in March, when a number of papers of exceptionally close interest to "JOURNAL" readers, and written by authors well known to them, were submitted for consideration. The occasion was an important one, from the point of view of the gas industry; and it is, therefore, a pleasure to draw attention to Vol. XVII. (Metal Melting Number) of the "Journal of the Institute of Metals," which is edited by the Secretary (Mr. G. Shaw Scott, M.Sc.), and published, price 21s. net, at the offices of the Institute, No. 36, Victoria Street, S.W.1.

Abstracts of the papers dealing with gas were given in our pages at the time; but in this volume those who are desirous of securing all the information available will find the different papers set out fully with illustrations, and a detailed report of the combined discussion. In the contributions of nine authors the latest information is afforded with regard to the subject of the melting of the non-ferrous metals. Those more especially referred to here are Mr. J. W. Hocking, of the Royal Mint, where great economy has been effected through the complete displacement by gas of the old-fashioned coke-furnaces; Mr. G. B. Brook, of the Sheffield Non-Ferrous Metals Branch of the Ministry of Munitions, who deals with coal gas as a fuel for melting non-ferrous alloys; Messrs. H. M. Thornton and H. Hartley, M.Sc., who refer to the same fuel for the melting of brass and copper in a crucible furnace; and Mr. C. M. Walter, B.Sc., who describes metal-melting by means of high-pressure gas. The claims of electricity, crude oil, and pro-producer gas are also capably dealt with. There is, in fact, an immense amount of useful information on the subject of metal-melting scattered through the volume, which will be invaluable to all called upon to make a careful study of the matter.

Other papers, too, are reproduced; and there is a section, consisting of fifty pages, and containing concise summaries of metallurgical communications published in every part of the world during the last six months, as well as a bibliography. The Editor and the printers have, in spite of the unprecedented obstacles by which such work is now confronted, succeeded in completing their task close up to time—and, more than that, have done it well.

COAL GAS FOR MOTOR TRACTION.

By SYDNEY F. WALKER.

THE present writer claims to have been the first to make the suggestion that coal gas can be employed for motor traction. This was some years ago; but it was only when the shortage of petrol set in that the attention of practical motor men was turned to the matter. The success of the experiment at Beeston, and on the char-à-bancs running between Eastbourne and London, is exceedingly encouraging; but the flexible gas-bag that is employed in these cases can only be considered as a very temporary arrangement, and a very crude one.

The writer's original suggestion was that gas should be compressed to as high a figure as possible, and carried on the cars in receptacles specially constructed for the purpose; and he believes that this will be the eventual outcome of the movement. He would, *en passant*, remark that one very important advantage of the use of coal gas in place of petrol is the elimination of the carburettor. Under present temporary conditions, where petrol is often used to assist the coal gas, the carburettor has been allowed to remain in place. But when gas has thoroughly established itself, there will be no reason for carrying this apparatus; and that in itself will be a very great gain.

The carburettor is one of the most delicate parts of the whole of the motor-car equipment. Motor-car troubles are due almost entirely to one of two parts of the apparatus—either the electrical ignition or the carburettor. Modern carburettors have been enormously improved, in common with other parts of motor-car equipment; but cases still occur of stoppage due to the filling-up of the jet, owing to some very small object having been allowed to remain in the petrol, and finding its way through into the jet. In addition, the regulation of the richness of the petrol mixture, under various conditions of traffic and load, is very difficult; and this has led to the complication of the apparatus in many ways. With coal gas, the regulation of the richness of the mixture should be very simple.

The writer would also suggest that, if and when compressed gas is carried on the car, the suction stroke and compression stroke of the engine may be dispensed with; and the two-stroke engine (which is the ideal of many motorists) may come right into its own. It will be remembered that with the two-stroke engine there is an explosion at every revolution; so that practically an engine of half the size ought to do the same work as one working on the four-stroke cycle. Under present conditions, the two-stroke engine is fighting a hard battle; but with coal gas it ought to have a "walk-over."

There are two principal difficulties in the way of the adoption of compressed gas—the cost of compression, and the weight of the containing cylinders. The space occupied by the cylinders is also, of course, a matter for consideration. The cost of compression, according to the figures given in the recent "Bulletin of the B.C.G.A.," should not be serious. With a small compressor, apparently the expenditure of 70 c.ft. of gas should accomplish the compression of 1000 c.ft. to a pressure of 300 lbs. per sq. in.; while with a larger plant the consumption is reduced to 62 c.ft. Probably, with larger compression plant, the consumption would be reduced still further. At a gas-works, once the engine and compressor were installed, the other charges should be trifling, as the attendance required is also very small.

The matter of the containing cylinder is more serious; but with the different alloy-steels that have been introduced during the last thirty years, in which the tensile strength and elastic limit have been so greatly increased, the weight of a perfectly safe cylinder for very high pressures should be brought within practical limits, once steel manufacturers are free to give their attention to it. The wire-wound cylinder that was described in the "JOURNAL" for Aug. 14, p. 280, is very promising, though it is not clear as to whether there is an inner containing cylinder as well as the spirally-wound wire-coils. In the modern rifled gun, from which the idea is taken, there is an inner steel tube, and wire of square section is wound on the outside—the object being to utilize the high tensile strength of the wire under the best conditions.

CHEMICAL DISCOVERIES AND PROCESSES IN GERMANY.

ACCORDING to the "Board of Trade Journal," the "Neue Zürcher Zeitung" recently published a review of German activities in technical matters in the field of war economics, in which it is stated that systematic investigations into the properties of pit coal have been carried on by the Kaiser Wilhelm Institut für Kohlenforschung, and have yielded important industrial results. The treatment of coal with liquid sulphurous acid at ordinary temperatures has produced viscous, golden-yellow mineral oils; the amount produced being 5 kilos. per metric ton. A process has also been elaborated by which through heating naphthalene under pressure, in the presence of aluminium chloride, an oil is produced which can be used for illuminating purposes in the same manner as petroleum. Finally, by treating with ozone, it has been found possible to alter the carbon compounds in coal to compounds soluble in water, the chemical importance of which cannot be at present estimated.

The utilization of lignite has been greatly extended. In the first place, it is being used extensively as a fuel in the industrial establishments which have recently sprung up in the Central German lignite fields, especially in the neighbourhood of Bitterfeld and Halle a/S, where the German air-nitrate factories are situated. A process has been discovered by which nearly twice the usual amount of ozokerite can be obtained from lignite; and the gas is being more extensively used for heating and smelting purposes. In the field of the exploitation of nitrates directly from air, a new process has been discovered, which works with quadruple air velocity through the reaction space, and produces a result about 80 p.ct. higher than could be obtained before.

In the metal industry, further progress has been made with the production of substitutes for copper, brass, and bronze; special mention being made of the different zinc and lead alloys, and of the increasing importance of aluminium. Recently, there have been new developments in ore smelting. With copper schists, the metallurgical possibility of going as low as 0·7 p.ct. has been shown; whereas formerly the average lower limit was 2·5 p.ct. Operations have been commenced upon large deposits of sandstone containing white lead. Successful experiments have been made in obtaining aluminium from clay, which will, it is claimed, make Germany in future independent of foreign bauxite. With nickel ores, the workable limit has now been reduced from 2·5 to 1·5 p.ct. A process has also been discovered for obtaining nickel and cobalt from pit waters containing these substances.

Oil and Oil Products from Coal.—According to a report to his Government by the United States Consul-General at Cape Town, says the "Board of Trade Journal," Angola coal deposits offer excellent possibilities for the production of oil and oil products, though the coal itself is of no great utility as fuel. The coal is said to be found in large quantities at Quilungo, which is only 90 miles from the port of Loando and about 7 miles from Zenze Railway Station, to which it is to be connected by rail in the near future. The coal is very easy to mine, being accessible by means of adits to the mountains; and it is now being worked to supply a Government contract. The contract coal is used for fuel; but the product in its raw state is said to be too bituminous for this purpose. It has much more valuable products, which a chemist has been extracting from it by means of a small still. It has been found that the coal, after being in the still, resolves into 31 p.ct. of crude oil, and 56 p.ct. of coke, which is a satisfactory fuel for engine-boilers. The oil has been submitted to various refining processes; and samples have been obtained in the form of good benzene suitable for cleaning, petrol for fuel, paraffin suitable for illumination or fuel, lubricating oil, and vaseline. A company has been formed for the exploitation of the mines.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

Report of Proceedings at the Annual Meeting.—Concluded from p. 467.

IN consequence of the deranged condition of the postal service, it was only possible, as then intimated, to publish last week a report of a portion of the proceedings at the fifty-sixth annual meeting of the North British Association of Gas Managers, which took place on the 7th inst. in Glasgow, under the presidency of Mr. JOHN LANG, of Alexandria. The question under discussion at the stage at which we were compelled to break off last week was the proposed Gas Council for Scotland; and from the conclusion of Mr. Vass's remarks the report is now resumed.

PROPOSED GAS COUNCIL FOR SCOTLAND.

Following on the speeches that have already been recorded, the subject was taken up by

Mr. LAURENCE HISLOP (Uddingston). He said that, unless it could be arranged that the representatives from the gas companies on the Scottish Gas Council were equal in number to those from the large corporations (such as Glasgow, Edinburgh, Dundee, and Aberdeen), there was just the fear that questions would be approached from the point of view of the benefits that were likely to accrue to the corporations. Unless the representation could be equalized in some way, there was rather the danger that decisions might be arrived at which were adverse to the interests of private or statutory gas companies. If this difficulty could be got over, then the suggestion made by Mr. Vass appeared to him to be a splendid one. So far as statutory companies were concerned, he believed there were only three that fell to be included in this category in Scotland—at least, that was all he could recall at the moment. He was altogether in favour of any movement which would deal with questions that affected the interests of gas engineers individually. If matters of this kind were taken up by a responsible body with some influence and weight behind it, then he believed that greater benefits would accrue.

The PRESIDENT remarked that something could be done to secure equalization of representation as far as possible. It rested with the Association to make certain Mr. Hislop's idea was given effect to.

Mr. SAMUEL GLOVER (St. Helens) said he was aware of the correspondence that had been going on between the President of the North British Association and the National Gas Council of Great Britain and Ireland. As a matter of fact, he was present at the meeting of the Executive Committee of the Council the previous week, when the letter that was submitted to the present meeting [*ante*, p. 467], in reply to the President's inquiry on the subject, was drafted. Speaking for himself, he could say that he was very anxious to preserve unity of action in the industry. Unity did sometimes work towards strength; and his main reason in speaking that day was to combat the suggestion that had been made, that the business which was conducted in London tended to conserve the interests of one particular part of the country more than another. A suggestion of this kind did not ring true, so far as the work of the National Gas Council was concerned. Proceeding, he (Mr. Glover) said he felt perfectly sure that their Scottish friends did not desire to be copyists. After all, there was something in a name; and, in proposing to establish a Scottish Gas Council, it looked as if they were trying to take this matter entirely into their own hands—having only the interests of Scotland in mind. He put it to them that in any instructions they proposed giving to the Special Committee who were to deal with the proposal, there should also be a remit to settle the name that was to be given to the new department of the Association's work. He appealed to them in the name of unity and strength for the future to realize that the National Gas Council existed for the purpose of serving the national interests of all gas undertakings as far as it possibly could. The Council quite agreed that it could be helped in its activities if there was a branch in Scotland, focussing the needs of the Scottish section of the industry; but it did suggest that the Scottish branch ought not to be called the Scottish Gas Council. Notwithstanding all Mr. Napier had said in his strong, eloquent, and argumentative address, he (Mr. Glover) gathered it was proposed that the new Scottish Gas Council should look to the National Gas Council for help. In Scotland, they were going to strike out on a new branch of their own; but at the same time they proposed retaining a hold of "Mother's apron strings," in the hope that, when occasion arose, they would get hold of "Mother's hands." It appeared to him that all ideas on the subject might be satisfactorily adjusted if they could, in Scotland, take up certain detail work by way of assisting the National Gas Council, and while doing so arrange for the National Gas Council to retain its position, name, and influence in the industry.

Mr. A. MASTERTON (Edinburgh) said that, while quite in sympathy with the important step contemplated, he was anxious to prevent, if at all possible, any misunderstanding with the National Gas Council. He thought it advisable, in the first instance, that they should appoint a Committee to confer with the Executive Committee of the National Gas Council. It struck him as being prudent that they should do this because, as things were, they did not know about the position that the National Gas Council might take up on the whole question. For example, they might ultimately turn round and say: "Oh, we want to have nothing whatever to do with this new movement in Scotland." If a conference was arranged, it would then be possible for the proposals from Scotland to be placed before the National Gas Council in a fair, straightforward, and honest way. To his mind, the course he had outlined would be the safer way, because there was no question but that they must act in accordance and in conjunction with the National Gas Council if they desired to have weight in any of the applications they put before the authorities.

Mr. J. W. NAPIER interposed at this point with the information that the previous Monday, the President (Mr. Lang), the immediate Past-President (Mr. Masterton), and himself had an interview in Edinburgh with Mr. Goodenough. They then pointed out to Mr. Goodenough that they were most anxious to continue collateral interests with the National Gas Council; and with this suggestion Mr. Goodenough quite agreed. Mr. Goodenough was strong on this point, that in Scotland they should not constitute themselves a separate body from the National Gas Council. He might say at once that this was not at all the intention.

Mr. ALEX. WILSON (Glasgow) said he felt that the whole root of the trouble under discussion was due to the small representation that was given to Scottish engineers on the Council of the Institution of Gas Engineers. On this point he rather felt that there had been some laxity in the North British Association in not nominating gentlemen at the proper time as representatives for Scotland on the Council. If nominations had been sent forward at the proper time, there did not seem to be the slightest difficulty in securing greater representation on the Council from Scotland. He made this observation because of his past experience as a member of the Council for some time. The Institution of Gas Engineers desired that there should be a fair representation on the Council of all parts of the country; but, of course, if nominations were not made timeously, there seemed little justification for complaint now. If the Scottish gas industry had been more numerously represented on the Council of the Institution, it was just possible that Scotland's representation on the National Gas Council would have been much more adequate than it was at present. With reference to the particular proposal which Mr. Napier had put forward, he personally did not think it was possible to have two National Gas Councils in the one nation.

Mr. NAPIER: That is not the proposal.

Mr. WILSON (proceeding) said he did not think the name that was suggested "Scottish National Gas Council" was going to help the gas industry at all. It rather seemed to him that, instead of imparting weight to the National Gas Council, it was going to take a little of its weight away. Divided counsels in this way rarely brought about unity; and certainly the separate bodies could not have the same weight and influence with Government Departments as was the case to-day when the National Gas Council represented the whole nation—both north and south of the Tweed. Personally, he thought it would be a great mistake to have the proposed new body described as the "Scottish National Gas Council." It might be possible for them in Scotland to have a Committee capable of dealing with certain matters of interest and importance to the industry; but he did not think it would be advisable to style the Committee the "Scottish National Gas Council." Then he would specially suggest that, before the next meeting of the Institution, steps should be taken to ensure Scotland receiving better representation on the Council of the Institution.

Mr. W. WILLIAMSON (Forres), said he gathered from the discussion that the subjects to be dealt with by the proposed National Gas Council for Scotland were matters which affected managers and their various gas concerns. He rather wondered why it came about that the Council of the North British Association of Gas Managers was not in a position to discuss these questions.

Mr. LAURENCE HISLOP (Uddingston) said that a point had emerged in the course of the discussion in regard to which he thought it was only fair that the members should be provided with the fullest information. There was at present a great outcry for better representation for Scotland on the Council of the Institution of Gas Engineers. Expression had been given to this demand for more adequate representation for Scotland, in the direction mentioned, both at the present meeting and at the Informal Meeting of Scottish Gas Managers. It was well, however, to keep in view the fact that in Scotland there were only some forty of their members who were members of the Institution of Gas Engineers out of a total membership of anything between 800 and 900. With such a paucity of membership, he did not see that Scotland had much cause for grumbling against the Institution. It ought to be clearly explained to the gas managers throughout Scotland that, if they desired better representation on the Council of the Institution of Gas Engineers, it was their duty in the first instance to become members of the Institution.

Mr. JAMES DICKSON (Johnstone) said the members of the Association ought to ask themselves how they were likely to be benefited by a Scottish Gas Council. Then they could also ask themselves what they could have done in the past if such a body had been in existence, and what they could do in the future if it really came into being? On the merits of the general question, he might say at once that he did not quite favour the idea of a body for Scotland which would be separate from, and independent of, the National Gas Council. Then it occurred to him that in their profession and industry, they were at times indebted to many of the extraordinary members of the Association for the inventive genius they displayed. It ought, then, to be considered whether the interests of the extraordinary members should be recognized in the representatives appointed to the suggested new body. He quite agreed the point he had introduced was a somewhat knotty one; but it was one which they might be the better of considering.

Mr. ALEX. MILNE (Aberdeen) explained, at the outset, that he could heartily approve of the suggestion put forward by Mr. Napier in the course of his interesting address. He (Mr. Milne) thought the formation of such a body as was indicated was very necessary indeed; but he was sorry to see the name of the body mentioned as being the "National Gas Council for Scotland." He rather agreed with some of the preceding speakers that if they had one National Gas Council representative of all the Associations, then it made for greater strength

than a number of sectional gas councils. It was said the National Gas Council for Scotland would be affiliated to the National Gas Council for Great Britain and Ireland; but he thought they were already affiliated to that body. They were all members of the North British Association of Gas Managers, and the Association was affiliated to the Institution of Gas Engineers, which, again, was one branch of the National Gas Council. In regard to the name of the proposed new body—for he took it it would be a new body—one could not get away from the fact that the duties so well enumerated by Mr. Napier were in reality duties which ought, under the constitution of the North British Association, to be competently considered by the Council of the Association itself. The trouble was that the Council did not do it; and they did not want to do it. It was felt that there should be only one body, which would not be a moving or changing body, but which would be thoroughly representative of large and small works alike, by whom the various questions which affected the industry from time to time could be fully discussed. He (Mr. Milne) could not help feeling that there was somewhat of a soreness in the minds of certain gentlemen present at the meeting because some of the officials of the larger gas-works in Scotland had been in the habit of meeting and discussing questions of joint interest, and had not given others in the profession the benefit of their deliberations. Speaking for himself, he felt some sympathy for those who took up this attitude of mind. Indeed, he often felt within himself that the managers of the larger works might be considered a little selfish, because they met in the way he had mentioned. This being so, he had some considerable sympathy with the idea that, under the auspices of some properly-constituted body, they should meet from time to time, so that the benefits to be derived from such meetings (if there were benefits) would be spread throughout the whole industry in Scotland. He did not know that there was much in a name; but it rather appeared to him that a difficulty might arise if they were to designate the new body the "National Gas Council for Scotland." After all, this new body was to be part and parcel of the North British Association of Gas Managers; and this seemed to preclude the presence of representatives from municipal bodies or the chairmen of gas companies. This was one point which he thought should be kept in mind. On the other hand, was it not possible that they could have some sort of Consultative Council or Information Bureau for the Scottish gas industry? Of late, he had thought a good deal over this matter of the establishment of an Information Bureau. Certainly, if it were formed, they could help each other a tremendous lot from time to time. How often in the course of a year did they require to write each other on questions (say) relating to wages paid to various classes of workmen? If there was an Information Bureau, the data could be placed at the disposal of all members directly on application. The scope of the Bureau could be widened to take in reports from engineers and managers as to the tests made with coal from time to time, and the suitability or otherwise of certain coals for gas undertakings. If data of this kind was collated by the Secretary in charge of the Information Bureau, it would prove of great benefit to a large proportion of members. There were innumerable questions touching upon parliamentary standards, calorific values, valuations, and so on, which could quite well be dealt with by this consultative body in Scotland, rather than by the National Gas Council. He was quite certain that a number of managers in Scotland must have been put to a great deal of trouble when the National Insurance Commissioners extended their benefits, so far as unemployment benefit was concerned, to many new departments of work. At the time when the subject was specially before him, he communicated with the National Gas Council, asking if they could give him any guidance or information respecting the experiences of others. The Council at the time could not give the desired information; but as a result of individual experience each of them acquired much information on the subject, and if it had been collated it would have proved distinctly valuable. He need not further elaborate this idea of setting up an Information Bureau. There were innumerable ways in which the Bureau would prove useful. He was prepared to go further than a Bureau, because if he could have his way, he would have a library in connection with the Association. Many books were now published in connection with the gas industry; and while it was impossible to purchase individually all the literature that was issued, each member would be quite willing to pay something for the privilege and benefit of having the loan of useful books for reference or instruction.

Mr. WILLIAM WILSON (Falkirk) thought the position in which the North British Association found itself was one into which it had been placed by the Institution of Gas Engineers, and also by the so-called National Gas Council, which was a self-elected body. The opposition which the National Gas Council was setting up showed they were afraid that Scotland would detract from the standing of the Council if she dared to elect any similar body of her own. In Scotland, they felt that at the present moment there were matters of vital interest to the gas industry which demanded immediate attention. They did not know what attention these matters were receiving from the National Gas Council or from the Institution of Gas Engineers; but they did know that the questions were of such a nature as to affect all their interests. Mr. Napier had come before them with a very definite proposal; and if they desired to alleviate the condition of things that had existed in the past, then he thought it was their duty to support it. One matter of vital interest at the present moment was the question of the restricted price for sulphate of ammonia. They would all agree, he thought, that the proposal in this connection was a very unjust one. Then there was the question of tar products; and there again he thought they ought to be getting more than they were doing. Further, very little had been said that day on the subject of the coal control; and he really did not know why. He was thankful to say that the coal control was likely to affect him very slightly; but he did feel that they were simply being brushed aside as an industry. Speaking for himself, he did not think they should overload this proposed Scottish Gas Council—after all, there was nothing in the controversy regarding the name—with work. He did not consider they should saddle it with the duties of an Information Bureau, a library, or anything of the kind; but he did seriously consider that all matters of vital interest to the gas industry in Scotland ought to be attacked at the earliest possible moment. If the National Gas Council cared to extend a hand, and help them in a brotherly way, then they in Scotland would accept their assistance; but they did not altogether relish the suggestion of being mothered. The question of valuation was becoming a serious one in these days. The whole position was very complicated; and it seemed to him something would require to be done immediately to remove a somewhat unjust and inequitable law. As to valuation, they in Scotland were up-against a state of affairs which warranted amendment of some kind or another.

Mr. NAPIER, in replying to the discussion, maintained that sufficient had been said to justify the formation of such a Scottish Council as he had proposed. He desired to emphasize the fact that the proposal was not intended to alienate the interest of the gas industry in Scotland or the profession generally in the country from the duties and responsibilities which they owed to the National Gas Council of Great Britain and Ireland. As regards representation, which was a somewhat sore point in Scotland, it was quite hopeless to expect that Scotland, under the present procedure of appointing members from the Institution to the National Gas Council, would ever be properly represented. His proposal was going to amend this position of affairs very considerably, in so far as representation by the Scottish Gas Council would be asked from the National Gas Council. The Scottish Gas Council would have on the National Gas Council several of its members. As there were so many points in connection with this matter that required to be evolved and determined, he would suggest that the meeting should agree to the appointment of a representative Committee. He was prepared to move that the Committee should comprise the official representatives from the gas undertakings of Glasgow, Edinburgh, Dundee, and Aberdeen, along with the members of the Council of the North British Association of Gas Managers, and when the details of the scheme had been formulated, another general meeting of the Association should be held—preferably on an early date.

Mr. WILSON (Falkirk) seconded the motion, which was carried.

TECHNICAL PAPERS AND DISCUSSIONS.

On resuming (after luncheon) the following papers were read and discussed: "Continuous Vertical Retorts in a Fifty-Million Works," by Mr. H. G. RITCHIE, of Irvine; and "The Dehydration of Tar," by Mr. G. H. SHARPLES, of Glasgow. The papers have already been published [*ante*, pp. 468, 469]; and the remarks to which they gave rise will be found below.

The Paper by Mr. Sharples.

Mr. JAMES DICKSON (Johnstone) wished personally to thank the author for the valuable information he had given in his paper. They were aware that, generally speaking, there were three grades in any subject—the primary, the secondary, and the tertiary. Frankly, it seemed to him that they had listened to the third grade in tar distillation that day. As Mr. Sharples had demonstrated, they put the oil through the plant a second time at the Johnstone Gas-Works; and as a matter of fact they dealt with considerably greater quantities than those shown in the paper. It was, he thought, worthy of note that in the two tests made by the author at Johnstone, the proportion of oil coming off, as compared with dehydrated tar, was a quarter more. The paper, he considered, was one more tribute to vertical retort tar, so far as quantity of oil content was concerned. The grade of benzol, on the other hand, was well known not to be of very much use for the purposes of the Ministry of Munitions. In putting through the oil at Johnstone, Mr. Sharples took off the tar and worked up to a temperature of 130° C. The number of gallons put through per hour was 250—giving a speed of travel of 817 ft. per hour. Then 19 gallons of crude naphtha per hour were recovered, of a gravity of ·900. The time the oil was exposed to heat averaged 10·9 minutes. Another point worthy of note was the very high viscosity of dehydrated tar. The low free carbon content was 5·23 p.ct., as compared with the Road Board minimum of 6 p.ct. It appeared to him that the specification of the Road Board, fixing a minimum of 6 p.ct., had been determined upon at a time when horizontal retorts were more on the market. There was undoubtedly a time when tars with a free carbon content round about 20 p.ct. were common; but the specification was now altogether out of date. He was ready to maintain that the specification stood in need of amendment, because his own experience had proved to him the worth of the tar in question. It had a fairly low specific gravity, a low free carbon content, and a high viscosity. Indeed, as the result of his past experience, he was not disposed to make the slightest endeavour to raise the gravity by adding pitch or any other foreign matter. As the results of his tests at Johnstone, Mr. Sharples had shown that by putting 756 gallons of tar through the plant, a yield of 416 gallons of oil was recovered. These were significant figures, representing pounds, shillings, and pence to many of the gas managers present.

Mr. DAVID ROBERTSON (Duncon), said he found that difficulty had been experienced in disposing of the dehydrated tar from his works because of the fact that it had a specific gravity of 1·075. The tar to his mind was perfectly suitable for paving and road purposes. Indeed, in his own district it had been used for paving purposes; and the results had been very satisfactory. In point of fact he had not seen better paving work anywhere. The unfortunate thing, however, was that the tar did not meet the requirements of the Road Board's specification. He thought, in justice to all concerned, that the specification should be rectified forthwith; and he rather thought a motion to this effect should be insisted upon by the present meeting of the North British Association of Gas Managers.

Mr. SHARPLES confessed to a feeling of disappointment that the discussion had not been one of greater length. The first part of his paper had been purely preliminary, with a view to inviting, if possible, a full discussion on the whole subject. Mr. Dickson had mentioned that at the Johnstone Gas-Works he put the oils through the plant a second time, and by so doing he was able to secure higher results. He (the author) quite agreed that such a thing was possible; but he would remind Mr. Dickson that the main object of the process was to get off a light oil in one distillation. He was rather afraid Mr. Robertson was

in error in giving the figure 1·075. This was the gravity of crude tar, and a very low gravity at that. He was grateful for the interest shown in the paper; and, although the discussion had been somewhat limited, he hoped the contribution itself would be carefully studied.

Mr. ROBERTSON acknowledged that he was wrong in stating the specific gravity of his tar to be 1·075. He had mentioned this figure in a moment of forgetfulness. The figure he ought to have stated was 1·095, which they would concede made somewhat of a difference.

On the motion of the PRESIDENT, Mr. Sharples was thanked for his paper.

Mr. Ritchie's Paper.

Mr. RITCHIE (Irvine) explained that, since writing the paper, he had prepared some notes in regard to steaming [*ante*, p. 469].

The PRESIDENT explained that, as time was somewhat limited, owing to the protracted debates earlier in the day, it would not be possible to allow much of a discussion on this paper. The author's paper was most interesting; and he (Mr. Lang) was sure Mr. Ritchie would be pleased to supplement the information embodied in it by answering any questions that might be addressed to him.

No questions were, however asked, and, on the motion of the PRESIDENT, Mr. Ritchie was thanked for his valuable contribution to the Association's "Transactions."

THE ASSOCIATION'S NAME—PROPOSED CHANGE.

The PRESIDENT said the next item on the agenda was consideration of the following motion which stood in his name: "That the name or designation of this Association be changed from the 'North British Association of Gas Managers' to the 'Association of Scottish Gas Engineers and Managers.'" As he had mentioned in his address, he (the President) thought the present was an appropriate time to alter their name to one which would designate more clearly who and what they were. To his mind, the present name did not convey to the public or outsiders whom the Association really represented; and as a matter of fact more honour was given to the Chairman of the "Informal Meeting of Scottish Gas Managers" than to the President of the North British Association. He ventured the opinion that the reason for this was because the word "Scottish" conveyed something definite to the outsider while "North British" was vague and indefinite. He understood that originally the Association was formed by the Fife, Perth, Kinross, and Forfar Gas Managers' Association and the Scottish Gas Managers' Association combining; and while he did not know what reasons weighed with them when they selected the name "North British," it looked as if it had been chosen as a compromise, as neither Association would wish it to be understood that the other had absorbed it. The name "North British" had certainly well served its day and generation. The members were nearly all Scotsmen; and the bulk of them represented Scottish works. The Council was drawn from the representatives of Scottish works, and it seemed only reasonable that the word "Scottish" should be included in their name and designation.

Mr. JAMES DICKSON (Johnstone), in seconding the motion, humourously remarked that he appreciated "Scotch," but he could not understand the term "North British" at all.

Mr. DAVID VASS (Perth) quite agreed with the President that the term "North British" was not distinctive enough. He would suggest, as the basis possibly for an amendment, that the name might be altered to that of "Scottish Gas Association."

The PRESIDENT indicated that he was not unwilling, if his seconder agreed to this course, to adopt the name suggested by Mr. Vass. What he was most anxious about was that the word "Scottish" should appear in their designation.

Mr. J. D. KEILLOR (Hawick) said that if proof was required of the necessity and urgency for additional driving force behind the Council or the Association generally, it could be furnished in the motion which the President had made. The proposal came at a time when those in high places were calling out for the highest possible efficiency in organization and for unity and brotherliness throughout all industries. It came at a time when they ought to be engaged in the centralizing, standardizing, or development of their organization. The motion made for nothing at all like that; in point of fact it was purely a sentimental proposal. He was determined to oppose it, because he felt that the present was not an opportune time to make any such change as that indicated, in view of the movements that were afoot. He further objected to the motion because he did not think that the name proposed was the best one that could be given to the Association. As the North British Association of Gas Managers, it did not seem to him that their nationality was being at all disputed or challenged. In the circumstances, he would move as an amendment that the Association should in future be known as the "Institution of Gas Managers—North British Section."

Mr. W. WILLIAMSON (Forres) seconded the amendment for the sake of retaining the old name. He was brought up in a works from which one of the earliest Presidents came, and he preferred to see the old familiar name retained.

Mr. W. WILSON (Falkirk) moved and Mr. R. SIMPSON (Cambuslang) seconded a further amendment, that no change should be made in the name of the Association.

On a division, the amendment by Mr. Wilson, to retain the name as it is, was carried by 21 votes to 12 recorded for the motion proposed by the President.

ELECTION OF OFFICE BEARERS.

The PRESIDENT announced that, as a result of the ballot, the following were the office-bearers for the ensuing year:

President: Mr. Robert Muir, of Galston.
Vice-President: Mr. R. W. Cowie, of Dalkeith.
Councillors: Messrs. A. C. Young, of Arbroath, and James Bell, of Dumbarton.

Mr. MUIR returned thanks for the high honour they had conferred upon him by electing him President. He would endeavour to do his best during the year to uphold the dignity of the chair.

PLACE OF NEXT MEETING.

It was agreed, on the recommendation of the Council, that the next annual meeting of the Association should be held in Glasgow, on a date to be afterwards fixed.

PRESENTATION OF THE PRESIDENT'S MEDAL.

Mr. ALEX. MASTERTON (Edinburgh) said that a pleasant duty had fallen to his lot—namely, to present Mr. Lang, as a memento of his year of office as President, with the gold medal of the Association. Mr. Lang had discharged his duties faithfully and conscientiously. He had throughout shown excellent prudence and tact, combined with rare ability.

Mr. LANG, in acknowledging the gift, said he would always look back with pleasure and pride to his year of office as President of the North British Association of Gas Managers.

The proceedings thereafter terminated with the usual votes of thanks.

WELDED V. SCREWED PIPE-CONNECTIONS.

According to the "Acetylene Journal," of Chicago, for May this year [Vol. XVIII., p. 604] some supplementary tests have been made to determine the relative strength in tension and compression of oxy-acetylene welded and screwed pipe-connections, under the direction of Prof. F. H. Gibley, in the Machine Construction Laboratory of the University of Kansas. As reported in the March, 1916, issue of the paper, the same experimenters completed tests on the strength of these connections when subjected to internal hydraulic pressure. The results of the latest tests bear out the conclusions given in the first series—viz., (*a*) The strength of the welded pipe connection is practically the same as that of unwelded pipe. By slightly building-up the weld, it can be made stronger than the rest of the pipe. (*b*) The strength of the welded pipe connection is much greater than that of malleable iron screwed fittings. (*c*) Though a careless or inexperienced operator may produce a leaky joint, nevertheless, if the pipe-line is tested for leaks when installed, it should give no difficulty in service.

The pipe samples (cut from standard black steel pipe) were all from the same stock; hence probably of uniform quality. Malleable iron couplings and ties were used for the screwed connections. The pieces for the butt-welds were cut at an angle of about 60° in a pipe-cutting machine, to get the necessary V groove for welding. The T welds were made by cutting a hole in the run and butting the outlet against the run. The ends of all the specimens were sealed by welding-in plugs or discs of boiler plate. Hydraulic pressure was supplied by means of a small pressure pump made for the work. Welded 2-in. and 3-in. specimens failed by splitting along the longitudinal seams of the pipe—the split stopping at the weld. A 4-in. welded specimen bulged under the high pressure, but did not fail in either the weld or pipe seam. Two of the screwed connections failed by a tearing apart of the fitting at the thread. The bursting pressures of the screwed connections were far below those of welded connections; and all failed in the fitting. Great difficulty was experienced in testing the specimens made up with screwed fittings, because the leakage through sand-holes made it almost impossible to reach the point of rupture. Only one case occurred in which there was failure at the weld; and that was merely a leak which did not develop until a pressure of 3850 lbs. per square inch was applied.

The "Coal-Gas for Motors" Campaign.

An active campaign is being carried on by the "Commercial Motor," in favour of the driving of vehicles by coal gas, which it describes as having "proved itself a sturdy yearling." In the current issue, there is a photograph of the first vehicle, a 2-ton van, receiving its charge from the station in the centre of the town which the Keighley Corporation have opened for supplying gas from their high-pressure system. There is also an article dealing with an invention—which has not, however, yet proceeded beyond the laboratory stage—having for its aim to utilize in connection with coal-gas storage for vehicles, the ability of certain substances to absorb gases. This idea, so far as our contemporary has been able to ascertain, has never previously been followed up seriously with coal gas, although the fundamental principles in the most elementary form have been known for at least fifty years. Whereas, it seems, the determination of the methane absorbent was relatively simple, the possible hydrogen absorbents were few in number, and difficult in character. But obstacles have been overcome by taking a minute particle of hydrogen absorbent and encasing it within a particle of the methane absorbent. This imprisoning of one absorbent within the other, in such a way as to form a homogeneous unit, constitutes, it is said, an achievement of chemical science, and is the *crux* of the invention. There is to be in the near future a series of tests on the high road with coal gas stored in this manner. On the following pages of the issue of the "Commercial Motor" now before us there is much further information, including instructions as to how to measure the top of a vehicle for the gas-container; and there are photographs of a Ford light delivery van converted to coal gas (showing a neat proportioning of the bag and a simple design of tray), and of gas-containers under test.

The estate of the late Mr. Walter Spencer, of the firm of Spencer & Son, of Elland, has been proved at £16,579.

WORKING QUALITIES OF SILICA BRICKS.

In a paper presented at a meeting of the American Society for Testing Materials, Messrs. M. L. Bell and C. E. Nesbit allude to the extending use of silica brick in bye-product coke-ovens. Formerly, as a remedy for the shrinkage and settlement common to bricks made of fire-clay only, a mixture with quartzite (which is commonly known as gannister) was used; but the silica brick, by expanding on heating, gave close well-fitted joints, no settlement trouble, and higher conductivity that greatly reduced the duration of the charge.

The quartzite should be hard and dense, containing 98 p.ct. of silica and the remainder equal parts of iron and alumina. It is ground with lime and water; and the degree of fineness and proportion of water used has considerable influence on the strength of the finished brick. The binder generally employed was lime; but iron, alumina, talc, water glass, and other substances had been used with more or less success. The most satisfactory proportion was found to be 2 p.ct., as only 1½ p.ct. did not give a sufficient bond, and larger quantities lowered the refractory properties and strength. The amount of water was varied to suit the composition of the mixture and the methods of manufacture; but about 10 p. ct. was the proper proportion for hand-made brick. A mud too wet would not retain shape on leaving the mould, and if too dry, there would be sponginess and lack of cohesion, corners not filled, &c., tending to low mechanical strength, susceptibility to spalling, and to slag penetration. Improper filling of moulds, dirty palette boards, or careless handling, all contributed to defective product. The drying was accomplished on a hot floor, or in tunnels heated by hot air from the flues of the kilns. On a floor, four to six days were required for 9-in. brick, and longer for larger shapes; but tunnel drying could be completed in 18 to 24 hours. Unless the material was bone-dry right through, it would crack when exposed to heat in the kilns. These were usually down-draught type, capable of containing 50,000 to 150,000 bricks. The green material must be truly shaped, or it would not take a good bearing or stack properly. It would not sustain a load of much more than 100 lbs. per square inch, and must not be overloaded. Shapes should not be placed near fire boxes, or carry much weight, and were frequently boxed-in. The burning occupied 10 to 15 days; the temperature being gradually raised to 1450°, and maintained at this limit for one to three days, according to the size of the kiln. The cooling must be very gradual, and extend to about five days.

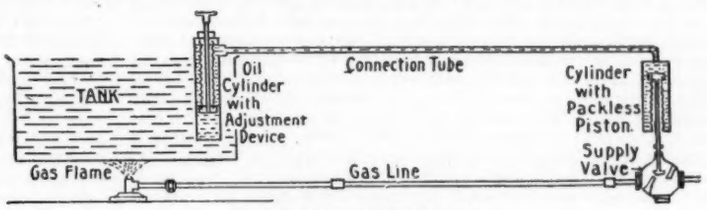
Experiments were made as to the effects of fineness of material and compression on the quality of the brick. Three separate sizes were mixed with 2 p.ct. of lime and 9 p.ct. of water, made into standard 9-in. brick, dried, and kilned under similar conditions. Compressions advancing by instalments of 250 lbs. per square inch, up to 2500 lbs., were attended with a slight increase in specific gravity and resistance to impact; but no appreciable difference was observable in percentage of spalls, slag penetration, and expansion. The finest ground mixture was slightly heavier and weaker, and showed large reduction in percentage of spalls—no other difference.

The principal causes of failure, spalling, crushing, and slagging cannot be entirely eliminated, but may be reduced to a minimum by careful attention to manufacturing detail. Almost any shipment of fire-brick will show at least 20 p.ct. defectives on inspection; and, on examination of six loadings of different brands, 60 p.ct. of the defects were attruibtable to moulding, 30 p.ct. to fire cracks, and 10 p.ct. to imperfect setting and irregular shape, all of which could be controlled by inspection and rejection at certain stages of the manufacture. The material should be carefully sorted, and all stock that is soft, or that contained excess of foreign matter, should be rejected. It should be ground as evenly as practicable, to pass a four-mesh screen—any large quantity of finer material being objectionable—and frequent sieve testings should be made. For hand-made brick, the lime should not exceed 2 p.ct., and the water be within 9 to 11 p.ct., the material strongly forced into the mould, thoroughly dried, very carefully kilned and cooled, closely inspected on leaving the kiln, and all defectives rejected. The purchaser should be allowed to inspect or test his consignment before it is loaded.

THE "SARCO" THERMOSTATIC REGULATOR.

This arrangement, which can be adapted for gas, water, or steam valves, and either tank or atmospheric control, is based on the expansion of oil when exposed to heat, which is caused to actuate a spindle attached to a supply-valve. An absolutely tight container is indispensable to satisfactory operation, as the leakage of even a drop of oil would upset the working. The packing for the moveable piston must be absolutely sound under enormous pressure, but also frictionless; and this requirement has been met by the "Sarco" spirally corrugated tube, a section of which is attached hermetically to the outer surface of the piston at one end, and to the inner skirt of the oil cylinder at the other.

The adjustment of the working temperature is effected by a piston fitted with a regulating screw, exposed in the medium to be controlled, and mounted as shown in a length of the spiral tube above described. The lowering of the piston in the oil-cylinder reduces the set temperature; and to increase it the piston is raised. There may be added a relief valve, which will yield in the event of the interior pressure exceeding a safe limit. It consists of a heavy spring interposed between the manually adjustable turn-button and the piston, and lifts when necessary, closing again under normal conditions. The spiral tube is claimed to remain sound under 3000 lbs. per sq. in. pressure.



Oil Cylinder with Adjustment.

THE KEMP COMBUSTION PRODUCTS RADIATOR.

This system patented in the United States, as described in the "Gas Record" [Chicago], is applicable to any system of flow-and-return heating tubes; but a special point is that the return must be smaller than the flow. The novel principle is the circulation of the products of combustion, as shown in the sketch.

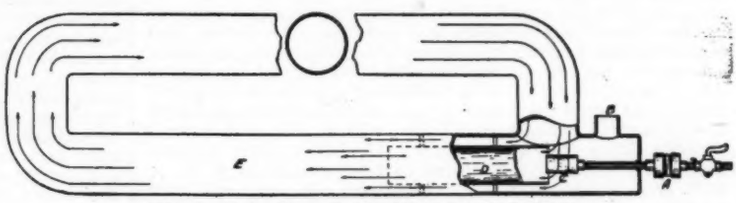


Diagram of the Kemp Combustion Products Radiator.

The tube E is 8 in. diameter, and contains an open inner tube D, placed immediately in front of the burner C, from which a self-sustaining mixture of gas, with the proper proportion of air to ensure complete combustion, is injected under a pressure of 1 lb. per sq. in. The flame is about 8 in. long; and the blast sets up a rapid circulation, as indicated by the arrows. Induced currents enter D at C, and also pass along the exterior. At a point behind the burner, and out of the path of the current, is an outlet B, 2 in. diameter, through which excess products of combustion escape, in proportion to the gases entering at C. The gases travel with great velocity; and the simplicity of the device renders it specially suitable for thermostatic control.

The system has been successfully adapted at Detroit to large japanning ovens for automobile parts. Each side of the chamber, clusters of three 5 in. flow and five 3 in. return pipes extend the whole depth. The excess products, which are neutral and contain no carbon monoxide, pass up the walls to the centre of the top, in a narrow space formed by an inner oven lining, and escape by a circular flue-pipe, at a temperature slightly lower than that obtaining in the oven, which proves a remarkable efficiency.

The Spellerizing Process for Protecting Steel Pipe.—As described in the American "Gas Age," this process is based on the facts that the physical formation and chemical composition of matter are distinct properties. Commercially pure iron is produced in several forms that have much the same composition, but differ considerably in physical properties and durability. Uniformity in composition, density, structure, and surface finish are the most important factors governing corrosion of the pipe. Other causes incidental to structure are the presence of carbon, oxide, or scale, all of which are electro-negative to iron. The actual composition, provided it is not unduly varied in the same piece, is of comparatively slight importance. Spellerizing is a method of treating metal which consists in subjecting the heated bloom to the action of rolls having regularly-shaped projections on the working surfaces, followed by smooth face-rolls while still hot. This is done twice, with a view of producing a dense surface texture, better adapted to resist corrosion, and especially pitting. Being entirely mechanical and independent of skilled labour, efficiency is assured; and even if impurities are present, the prepared surface ensures uniformity of action. If corrosion occurs, it is all over alike. Spellerized steel tube may be safely joined to wrought or cast iron pipe; whereas the same stock, untreated, if so used, shows a decided tendency to corrosion at the juncture,

LARGE INDUSTRIAL APPLICATIONS OF GAS.

Flash Annealing—Foundry Ovens.

Prominent place continues to be given in the "American Gas Engineering Journal" to new applications of gas for technical purposes. A recent issue contained a description of the use of gas for flash annealing large projectiles, by Mr. E. A. Pilnecek, of the Surface Combustion Company.

In course of manufacture, the rough shell is heated to 1650° Fahr. and water quenched, which leaves the metal glass-hard, especially on the outer skin. This must be softened before it can be surfaced; but the body of the metal must not be affected. The softening is accomplished by a rapid surface heating that does not penetrate far—known as flash annealing. After trying every known type of oil or electric furnace, without getting satisfactory results, a large steel works installed two gas-fired flash annealers, which proved efficient in every way. The gas was used at ordinary pressures, with an air-blast from a positive blower; and the quality and quantity of the mixture were controlled by one valve. The furnace is an upright cylinder comprising thick fire-brick walls, backed with insulating material, enclosed in a heavy metal case, mounted on a cast-iron base, and set on a foundation in a shallow pit, to bring the top to a convenient working height.

A larger make of shell was handled later on, and two more gas annealers were installed. In these, the burners were placed radially, but discharged tangentially on the inner walls, thus thoroughly mixing the gases and ensuring uniform temperature in all parts. They were supplied with gas at 10 lbs. pressure, which inspirated the necessary air supply, avoiding air compressors and a second pipe line, controlled by a single valve. A 600 B.Th.U. gas is used; and when starting from the cold the furnace must be raised to 1650° Fahr., which occupies 1½ hours and consumes 1080 c.ft. of gas. A shell is then lowered through a round door on the top by means of a crane, to the centre of the furnace, and remains an average of 10 minutes. By this time the inner walls will have dropped to 1420°, and the skin of the shell will be raised to 900°, with a consumption of 90 c.ft. of gas. After withdrawal, the door is closed and the furnace brought up to the original temperature, using 60 c.ft. of gas and occupying 5 minutes. One furnace will anneal seven shells within 2 hours; a few minutes being lost in handling the charges. The total consumption of gas is 168 c.ft. per shell.

In another article, Mr. Bruno Rahn, Industrial Engineer to the Milwaukee Gas Light Company, is enthusiastic about the successful application of gas for baking foundry cores and moulds. When coal or oil is used, the goods are apt to be injured by unequal heating. If the temperature is excessive, they dry too rapidly on the exterior, are rendered brittle, and likely to fail when the casting is run; if underbaked, they remain too soft. The atmosphere of the foundry is made unwholesome and offensive by the escape of noxious products of incomplete combustion. Gas secures delicate control of temperature, uniform heating, complete combustion, and no air contamination—substantial advantages that ensure its introduction independently of the comparative fuel costs. The ovens are heated by pipe atmospheric burners at the bottom, as in a gas-cooker, and may range in size from a small portable casing that can be carried round from place to place (sometimes a great convenience) to brick chambers, 32 ft. × 10 ft. × 10 ft. high, with sliding doors each end, and a rail track for trolleys, one of which may be loaded with green stuff while the other is in the oven, or with conveying tables in constant motion, in either case securing continuous service. The ovens for small, delicate pieces may be equipped with rotary trays or sliding drawers of the bureau type, and large articles are carried on trucks. Small goods can be baked more rapidly than large, which must dry through slowly; the temperature being 380° to 450° Fahr., according to composition and dimensions.

Solid fuels require ample storage against irregularities in supplies, labour for handling, lighting up, maintenance, and removing ashes; and liquids must have store tanks, compressed air lines, &c. With gas, there is no difficulty in meeting strict official or insurance regulations, as no inflammable material is stored on the premises. The bureau drawer type is popular, because when the drawer is extended the back effectually prevents the escape of products of combustion. An oven 7 ft. × 4 ft. × 4 ft. deep can be maintained at 400° Fahr. on less than 300 c.ft. of gas per hour; and the 30 ft. pipe burners, with air blast and gas under thermostatic control, used in the chamber ovens, consume 1200 to 2000 c. ft. per hour.

The demand is even over the working day, and not influenced by season changes at different periods of the year; so this line of business is particularly attractive at the gas-works. The advantages above indicated, together with economy of labour by avoidance of breakage, increased efficiency, quicker heating up, liberty as to loading arrangements, sanitary advantages, lower cost of first outlay, maintenance and repairs, render it equally so at the foundry.

In the "Baltimore Gas and Electric News," Mr. R. R. Barr describes a method of expanding large cranks weighing 1800 lbs. for ocean-going vessels. The apertures require to be expanded $\frac{1}{16}$ inch in diameter, so as to admit the placing of the axle and crank pin, which is held firmly by the contraction of the metal as it cools. The heat is applied where required by means of a ring burner with air-blast.

GAS DISTRIBUTION AT ATLANTA (GA.).

A description of three distinct systems of distribution on the district supplied by the Atlanta Gas Light Company has recently been published by their Distribution Superintendent, Mr. C. J. Winmeister. It comprises low, medium, and high pressure—all controlled from the gas-works. The original ordinary pressure system still supplies the home districts, and includes cast-iron trunk mains, 30 in. to 12 in. diameter, extended to various parts of the city, and connected to supply mains 8 in. to 4 in. diameter, also a few short runs of 2 in. steel pipe.

Later, some of the trunk mains were isolated, and supplied with gas at 1 lb. per sq. in. pressure (27 in. water-gauge), for the purpose of delivering substantial quantities to outlying districts; and the arrangements admitted of an increase up to 5 lbs. pressure if required. At seven locations, district control pressure regulators were installed in underground chambers; and these delivered gas to low-pressure mains at 3 in. or any desired pressure below the initial. The total length of the low and medium system mains was 239 miles.

The outlying district of Decatur was piped for medium pressure with 6-in. and 4-in. cast-iron pipes, 2-in. steel mains, and 1-in. steel services, and individual house governors with mercury safety seal and vent on the inlet side of each meter. The steel pipe was threaded and joined by means of long line couplings, and intersection street connections were made with Dresser couplings. This installation included twelve miles of piping. It served 450 customers, carried 25-in. water pressure, was put into use over two years ago, and has remained absolutely gas tight. When laid, it was tested under air pressure at 15 to 20 lbs. per sq. in.

The high-pressure system supplied College Park and East Point. It included steel pipe of 4 in. to 2 in. diameter, made in 40 ft. lengths with plain bevelled ends, and joints welded by compressed acetylene and oxygen; and branch lines built of 3 in. and 2 in. similar pipe. The whole was proved under 100 lbs. air pressure, and at present supplied by means of steam driven compressors, at 5 lbs. to 10 lbs. per square inch, which could be increased to 100 lbs. All services were ¾-in., with either welded or special clamp connections on the mains, and a special type of house governor on the inlet of each meter.

Lyon-Spencer Gas Containers.

A great deal of attention is being paid just now—and naturally so, in view of the practically insurmountable obstacles which have been raised to the use of petrol in a general way—to the suitability of coal gas for driving motor vehicles; and information as to its adoption comes to hand from all parts of the country. The vehicles concerned have usually been of the heavier type, arranged with containers on top to take a supply of gas at pressures available—facilities for storage proving something of a problem in connection with pleasure cars, taxi-cabs, &c. There is, however, no doubt that as time goes on an increasing number of smaller cars will be propelled by gas; for suitable equipments are now procurable. Attention has been drawn to a well-made series of containers manufactured by Messrs. Ernest Lyon, Ltd., of No. 91, New Bond Street, W. Of the several types, there is one exceedingly light and well-finished pattern for high-class landaulettes and touring cars; another for delivery vans, large touring cars, &c.; and a third—a special light gas-proof container, made in standard sizes—suitable for all kinds of Ford cars, and capable of running about 25 miles on one charge. The "Lyon-Spencer" installation includes one of the containers, a special carrier to ensure rigidity, and the necessary fittings for conducting the gas to the induction-pipe of the engine. The containers are neatly shaped, and colour-finished to match the car; and it is pointed out that they retain perfect proportion in deflating and lie flat when discharged. In the case of closed cars and commercial vehicles, they are fitted on the roof of the body, and with open cars on a specially constructed canopy running the whole length of the body. Owing to the special shape of the containers, the firm claim a storage capacity of about 10 p.ct. in excess of the circular type.

Midland Association of Gas Engineers and Managers.—The autumn meeting will be held on Thursday, Oct. 11, in the Grand Hotel, Birmingham; and for this occasion the Committee have decided that there shall be no set papers, but that the interests of the members will best be served by informal discussions on technical matters of special concern at the present time. The election of officers takes place at this meeting.

Winter Daylight Saving in Germany.—Now that summer time has come to an end, says "The Times," Germany is organizing new schemes of daylight saving for the winter, in order to economize fuel and artificial light. Notice has been given by the General in command of the Münster Army Corps District that the consumption of gas and electric power in shops, restaurants, and so on must this winter not exceed one-half of the consumption in the winter of 1915-16. All the military and civil authorities, businesses, and other private undertakings are required to alter their office hours, from Oct. 1 onwards, to the time between 8 a.m. and 4 p.m. Schools will keep the same hours. The lighting of shop windows and the use of passenger lifts are forbidden, and all restaurants are to be closed at 9 p.m.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Low Temperature Distillation of Inferior Coals.

SIR,—In reading the interesting article by Mr. T. F. Winmill [*ante*, p. 461] my attention is drawn to the point that the distillation of the coal was carried out under a vacuum of from 26 to 28 inches of mercury.

If the plant mentioned is merely an experimental one erected for academic purposes, this fact may pass. But if the carbonization be carried out in future on a commercial scale, it appears to me that working under such or an approximate vacuum as that mentioned in the article, would involve a collision with the patents held by the "Tarless Fuel Syndicate," which cover the carbonization of coal at low temperatures under vacuum; and I have no doubt that the proprietors of the patents would exert every effort, through the proper legal channels, to uphold their proprietory rights.

As far as using in the retort a "stirrer," or even a continuous screw or helix, it is curious how this idea has fascinated carbonizers—especially of the amateur or patent-seeking type—for almost a generation past; and the records of the Patent Office bear testimony to this.

Quite recently I had, in a foreign country, the opportunity to practically work an installation of this type, erected at some considerable cost, and on quite a substantial scale. It was erected to deal with the easiest of coals to work—viz., a poor lignite, of course non-caking. It failed hopelessly, as it churned the lignite to breeze (some 30 to 40 p.ct.), and failed to produce a reasonable amount of tar oils. The installation is to be displaced in favour of a more modern and perfected system which is now being effected, as the trials of the same lignite sent to this country to be tested by the process indicated proved very successful, yielding:

Petrol	2·2 gallons per ton.
Light oils	4·4 " "
Heavy oils	6·95 " "
Sulphate	22 lbs. "
Good smokeless fuel	12 cwt. "

My experience goes further. With screw-retorts, working rich bituminous coals or cannels, there is the greatest mechanical difficulty in getting the screw to pass such coals or cannels, as when they get to the sticky stage, the power required to operate the screw is enormous.

F. D. MARSHALL.

19, *Queen Anne's Chambers, S.W., Sept.* 13, 1917.

Profiteering in Coal.

SIR,—When recently writing to the Ministry of Munitions on their proposed methods for increasing the supply of tar, I pointed out that for some time past there has been a considerable reduction in the make of gas per ton of coal, and in the make of tar and ammonia products throughout the country—due to the abnormal quantities of ash now contained in the coal delivered by the various collieries. The coal is not being picked at the pits mouth, as in pre-war times; and one coal I had under examination which contained 5 p.ct. of ash before the war now contains 13·8 p.ct.

The gas undertakings using this coal are paying for a large quantity of inert material; and so much waste material is carried by the railway companies. This involves labour and money; but it could be readily overcome by the colliery owners having the shale picked from the coal by women at a very small cost per ton.

I think it is quite time all gas undertakings made a combined stand against this imposition that is being thrust upon them. I feel that, so long as they are quiet, they may go on paying for the excess of rubbish now being delivered with their supply of coal.

The Government have guaranteed collieries an increased price for coal; and I am of opinion that it is their duty to protect the purchasers of coal for industrial purposes, and insist on the quality being delivered as before. By this means the Government would materially increase and improve all products obtained by the distillation of coal.

Southport, Sept. 11, 1917. JOHN WEST.

Motors Gas Container Connections.

SIR,—In course of conversation with Mr. Alderman Kay, the Chairman of the Manchester Corporation Gas Committee, I am given to understand that all sizes of connection are being used in conjunction with the gas-bags supplied by various firms. Your readers will readily understand that it is highly desirable that a standard size of fit should be adopted, so that the process of filling can be undertaken at various corporation works with the greatest possible dispatch.

The Manchester Corporation, I understand, would like to see the 2 in. gas size adopted as a standard. I suggest that it would be interesting to invite your readers to discuss the matter through your columns; and I think there would be very little difficulty in coming to a definite agreement on the question at an early date throughout the country, and thus save endless trouble which is undoubtedly in store for owners of these gas-bags, if no arrangement is introduced.

Another suggestion, which it is, to my mind, desirable should be adopted, is that all quotations for the supply of gas for motor-cars should be at "per 100 c.ft."

The Manchester Corporation are, I am informed, prepared to test gas-bags as to capacity, and to give certificates of such tests; and I think that if all corporations who are interesting themselves in the "Gas for Motors" movement would adopt the same method, and accept each other's certificates, and thereby be able to fill gas-bags which had been officially tested, without the necessity of the gas having to go through a meter, considerable time and inconvenience might be saved.

LEO SWAIN,
Chairman, Manchester, Liverpool, and District C.M.U.A.

239, *Deansgate, Manchester, Sept.* 13, 1917.

REGISTER OF PATENTS.

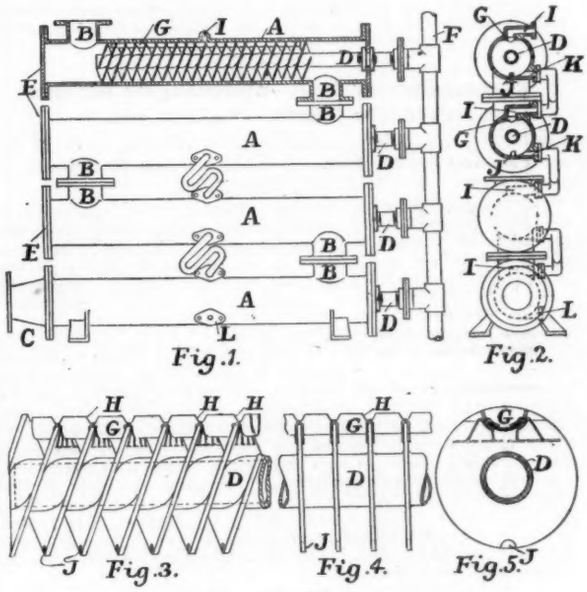
Vaporizing Oils for Enriching Coal Gases and Avoiding Naphthalene Deposition.—No. 108,579.

SWINDIN, N., of Wanstead, Essex.

No. 14,093; Oct. 4, 1916.

This apparatus for vaporizing oils is particularly designed for treating high flash-point oils (paraffin oil) and passing the vapours so formed into a current of coal gas in order to avoid naphthalene deposition.

The invention consists in interposing in a series of main pipes superimposed one above the other and connected by branch pipes at right angles, so that the current of (say) coal gas may pass in succession through the whole series of pipes from the bottom to the top, a large surface of heated films of oil to be vaporized. The films are formed by causing oil to trickle over the surface of a steam-heated pipe having upon it a number of circular gills or (preferably) a continuous fin in the form of a helix. Upon the upper edges of the gills on each gilled pipe rests a long shallow oil-distributing tray having a series of lips, each pair of lips overhanging a gill. Through the walls of each main pipe, immediately above the oil-distributing tray, is fixed an oil-pipe—the uppermost pipe being connected to the oil-supply tank, while the oil-pipes on the lower main pipes are connected to the under side of the next main pipe above, and bent in the form of seals.



Swindin's Oil-Vaporizing Apparatus.

Fig. 1 is an elevation of the vaporizer, showing the topmost main pipe in section. Fig. 2 is an end elevation and cross section through the oil-pipes. Fig. 3 is a longitudinal elevation of the closed end portion of a helicalfinned steam-pipe, showing the oil-distributing tray in position. Fig. 4 is a longitudinal elevation of a portion of the pipe, showing the oil-distributing tray in position. Fig. 5 is a cross-section through both types of steam-pipe, showing the oil-distributing tray.

A are a series of main pipes superimposed one on the other and connected by branch pipes B so that a current of gas entering at C passes upwards through each pipe A in series, leaving the apparatus by the branch B on the top pipe. D are gilled or finned steam-pipes, one of which is inserted in each of the main pipes. One end of the pipe is attached to the main pipe A; the other end is closed, while a flange E closes the extreme end of all the main pipes except the lowermost, which has upon it the reducing piece C. Steam is admitted to each gilled pipe by a distributing pipe F. Lying in notches formed in the gills of the pipe is the oil-distributing tray G provided with lips H—each pair overhanging a gill or helical fin. By capillarity oil flows out of the tray to the sides of each fin, and is evenly distributed. The oil to be vaporized enters the top main pipe by a branch I, flows into the distributing tray, and overflows by the lips on to the gills of the steam-pipe D. The excess oil collects at the bottom of the main pipe through openings J in the fins, and leaves by a branch K to enter the corresponding branch of the next lower main pipe by a seal pipe. The oil, in like manner, enters and leaves each of the lower main pipes in series till it reaches the lowermost pipe, and leaves by the branch L through a seal pipe.

The apparatus operates as follows for vaporizing oils, for washing out impurities or other bodies from gases, vapours, and the like, or for bringing gases into intimate contact with liquids. The gas is caused to enter the lowermost main pipe at C, and flow upwards through each superimposed main pipe in series and out again to the mains of the works to which the apparatus is connected. When the steam-pipe fig. 3 is fitted, the gas must screw itself so to speak along the main pipes, "which greatly lengthens its travel through the apparatus, which time it is in contact with freshly-formed films of oil." When the circular gilled pipe fig. 4 is fitted the gas passes through a series of staggered openings in the gills—a course which sets up eddy currents and promotes intimate contact of the gas with the films of oil or fluid

on the gills. Steam is admitted by the pipe F to each of the gilled steam-pipes at such a pressure as will maintain a temperature of vaporization of the oil. For paraffin oil, a temperature of 140° Fahr. is found suitable, though lower temperatures may suffice to vaporize a sufficient quantity of paraffin oil.

Gaseous Fuel Furnaces.—No. 108,701.

IONIDES, A. C., JUN., of Porchester Terrace, W.

No. 11,374; Aug. 11, 1916.

This invention relates to the utilization of combustible gaseous mixtures, wherein the combustible and supporter of combustion ("gas" and "air") are admixed in self-burning proportions "permitting practically complete combustion without the addition of external air."

In applying this type of combustion to various uses—such as crucible furnaces, or furnaces for billet heating, case hardening, or the like, as in patents Nos. 9568 and 15,322 of 1915 and No. 102,983, using jacketing with the products of combustion and venting of the jackets downwardly—the inventor says he has hitherto found it necessary to use a considerable number of devices supplying the mixture at a number of points into the furnace chamber in order to secure uniform heating and obtain the highest efficiency, which has the disadvantage of involving considerable expense and complication. It is the principal object of this invention to avoid this; and a further object is to secure the uniform maintenance of any desired temperature in the furnace. The invention consists in providing between the main furnace chamber and the nozzles from the mixing devices a combustion chamber into which the nozzles deliver and from which the combustion gases pass through one or more long narrow orifices into the main chamber.

The invention will be dealt with in the paper the patentee intends to read to-morrow (Wednesday) before the Institute of Metals—see next week's "JOURNAL."

Regenerators or Heat Interchangers for Gas Producer Plants.—No. 108,710.

LYMN, A. H., of Tothill Street, Westminster, RILEY, L. A., of New York, and RAMBUSH, N. E., of Tothill Street, Westminster.

No. 11,471; Aug. 14, 1916.

The inventors point out that the various kinds of regenerators or heat interchangers used in connection with gas producing plants have the disadvantage that a large amount of dust, dirt, and carbonaceous matter is deposited into a solid cake on the tube serving as the heat interchanger—a deposit which causes the heat interchange through the metal walls to diminish very rapidly, so that "after a short time it becomes ineffective and the whole plant has to be stopped in order to clean the surfaces of the tubes."

The present invention aims at overcoming these defects by forming the heat interchanger of a plurality of concentrically arranged chambers (preferably cylinders), which are arranged in such way that hot gases from the producer are caused to traverse it in serial order. Intermediate with, or both intermediate with and surrounding, the chambers are arranged parallel flow conduits for the air and steam passing to the producer in such way that it is caused to traverse the chambers and/or tubes preferably in the opposite direction to that taken by the heating medium—a plurality of connecting pieces being provided between the spaces traversed by the medium to be heated. Means are also provided for enabling the surfaces of the regenerator to be cleaned, and for collecting the dust and carbon particles while the apparatus is in operation.

Indicating the Volumetric Flow of Gases. No. 108,711.

WERNER, E. E., of St. Louis, Missouri, U.S.A.

No. 11,473; Aug. 14, 1916.

This invention relates to an improved form of the type of apparatus in which a varying air or gas pressure is gauged by a discharge from it into a liquid-holding receptacle into which the air or gas passes through a tube or cylinder having perforations in it so positioned that, as the pressure rises and falls, the openings are more or less uncovered by the liquid within it, and in which the air or gas escapes through the holes and rises in bubbles (of greater or less number) visible, so that an attendant seeing them can ascertain or read the pressure.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Sept. 12.]

Nos. 12,596—12,921.

BEST, E. A.—"Gas-lighter." No. 12,659.
CRAIG, W. F.—"Gas-lighters, &c." No. 12,872.
FLEETWOOD, J.—"Incandescent gas-mantles." No. 12,694.
GOODALL, CLAYTON, & Co.—"Manufacture of coal gas." No. 12,834.
GUNDRY, P. G.—"Liquid-flow meters." No. 12,617.
HARRISON, W.—"Manufacture of gas-tight membranes and fabrics." No. 12,598.
HODGE, G. H.—"Bakers' oven heated by gas under pressure." No. 12,821.
MERRIMAN, H. O.—See Gundry. No. 12,617.
MURPHY, S. J.—"Water-gas producers." No. 12,677.
OTTINO, G. P.—"Storing coal gas, &c., for use in motor-vehicles." No. 12,722.
SETTLE, T.—See Goodall, Clayton, & Co. No. 12,834.
STOCKDALE, W.—See Hodge. No. 12,821.
TAYLOR, W.—"Apparatus for condensing and retaining compressed or liquefied gas in a receiver, for use with motor-vehicles, &c." No. 12,820.
TAYLOR, W. M.—"Gas-fired water-heaters or steam generators." No. 12,850.

MISCELLANEOUS NEWS.

EMPLOYMENT OF WOMEN IN GAS-WORKS.

Official Information as to Substitution for Enlisted Men.

In the latter part of last year, there were issued by the Home Office and the Board of Trade a series of pamphlets dealing with the substitution of women in industry for enlisted men; the object being to make available for manufacturers all over the country the fullest information as to the processes in which, and the methods by which, such temporary substitution is already being carried out. The series includes 27 industries; and Pamphlet No. 22 relates to gas-works. The information given in the first edition of this was reproduced in the "JOURNAL" for Oct. 10, 1916 [p. 90]; but at the close of the year, careful inquiries were made to ascertain what further developments had taken place in the substitution of women—the new information thus obtained necessitating the issue of a second edition of the pamphlets. A copy of this new edition has been officially forwarded to us, and to bring the matter up to date is reproduced below.

I.—Processes in which Women can be Substituted for Men.

Before the war, women were not employed in this industry, except perhaps in the case of a few small works. The processes and the machinery employed are of a more complicated character in large than in small gas-works, and the weight of material to be handled much greater.

In view of the wide variations in plant and methods of manufacture to be found in different gas-works, it is not suggested that women can or ought to be employed in all such works in the processes named below. The circumstances of each case require separate consideration. It may, however, be said that even now many managers of gas-works do not fully realize how large a part of the work on which until recently only men were employed can be, and is being, done efficiently by women substitutes.

In a considerable number of instances, operations are being made easier for women workers by the provision of lighter tools, barrows, &c., and by the introduction of machinery enabling them to deal with heavy weights. Where women are pronounced unsatisfactory as substitutes, it is almost invariably found that no attempt has been made to provide either suitable tools and labour-saving appliances, or protective clothing and other necessary comforts.

Besides the occupations enumerated in the list below, women are now employed in large numbers in the offices of gas-works, both in work purely clerical and in semi-technical work as rental clerks. They are being increasingly substituted for men in the following auxiliary occupations: Reading and inspecting meters, collection of accounts, and collection of pence from slot-meters. A beginning has been made in their employment in the department of stove and meter repairing on customers' premises.

Women are now successfully replacing men in the following processes in and about gas-works. [Where women are employed only as assistants, the name of the process is followed by the letter A.; P. (for partial) indicates that there has been subdivision or re-arrangement of the process to facilitate substitution. In other cases complete substitution has been effected. Notes as to labour-saving appliances or other points of interest are added in italics.] Processes not included in the list are those in which inquiry has not at present discovered cases of successful substitution:

Coal Department (Coal Porters).

Breakers, elevators, conveyors. Attending. P. *Men usually do repairs.*
Stacking and unstacking. P. *Lighter lumps only handled, in two throws instead of three. Strong type of woman necessary.*
Weighing.

Retort-Houses.

Coke quenching, clearing up, pan mucking. P. *Very strong women required.*
* Cleaning mouthpieces and augering pipes. Charging and discharging—by machine. Trimming, firing, poking-in, door shutting, coke spreading. P. *Very strong, carefully selected women required.*
Machine stoking.

Purifiers.

Filling and emptying boxes or vessels. P. *Lighter barrows.*
Mixing, screening, and turning oxide, loading into barrows. P. *Lighter barrows. Breaking up by machine instead of by hand in some cases.*
Slaking lime.

Coke and Breeze (Coke Porters' Work).

Breaking, washing, screening, riddling, picking, reclaiming. P. *Strong type of woman required.*
Crushing. *Machine introduced in some works to replace hand crushing.*
Filling carts and barrows. P. *Only very strong women are suitable for cart-filling.*
Filling sacks from hoppers or heaps (bagging); weighing; carrying. *The use of ½-cwt. bags facilitates the employment of women in these processes.*
Sorting clinker.
Wheeling in barrows. *The use of ½-cwt. bags facilitates the employment of women in this process.*

Engine (Stationary) and Exhauster.

Cleaning and oiling. P.

Maintenance (Repairs).

Bricklaying. P.
Bricklayers' and retort-setters' mates' work. P. *Hods are replaced by baskets and lifting tackle.*
Joining and woodworking machining. P. *On suitable selected work.*
Turning, fitting, and machining (metal). P. *On suitable selected work.*

Yard Work.

Cleaning yard, floors, and windows.
Crane driving.
Gasholder and other scraping, painting, and tarring. P. *Improved cradles are introduced to increase sense of security. Annular pits are fenced.*
Sack repairing, cleaning retort-mouthpieces in yard, cleaning vehicles.

* Suitable only in certain works.

Ammonium Sulphate.

Bagging.
Centrifugals. Attending.
Still assistants' work. P.

Gas-Stove Repairing.

P. *On the lighter class of stove.*

Meter Repairing.

P. *On the smaller meters.*

Timekeeping.

P. A.

Laboratory Work (Chemical and Physical).

Photometer work. P.
Research work. P.
Routine testing. P.

Delivery.

Carmen's work and carting. P.
Motor driving.

II.—Supply of Women Workers.

Special arrangements have been made by the Government for recruiting women workers to take the place of enlisted men. Employers should apply without delay to the local Employment Exchange, where they will be given every assistance in obtaining the workers they require. In some cases, owing to the special need for women of strong physique, it may be necessary to bring women from other districts; and the fullest possible information should be given by employers in order to secure the right type of women workers. It is not anticipated that there will be any difficulty in securing such workers, if suitable arrangements are made and adequate remuneration offered.

III.—Relaxation of Factory Acts.

Where the continuous nature of the process or exceptional pressure of work justifies an application for relaxation of the Factory Acts, the Home Office is prepared to consider the special circumstances of each case. Full information as to the mode of application for relaxations can be obtained from the District Inspectors of Factories.

IV.—Arrangements in Factories.

As much of the work to be done is dusty, dirty, wet, and involves exposure to weather, it is imnportant that special clothing, to be kept at the works, be supplied to all women employed in the yard or buildings. Those working in the open air or on wet processes should have waterproofed garments or oilskins and clogs. In retort-houses and other departments where excessive heat has to be encountered, thick woollen clothing is necessary. Wherever climbing is involved, a trouser suit is required; and on account of the dirty nature of the work, head-coverings are needed. The best clothes for outdoor labouring work are trousers and a tunic reaching to the knee, with a cap and clogs. The suit should be cut so as to permit of the wearing of a considerable amount of underclothing, to which the type of woman employed in gas-works is accustomed.

The constant contact of the workers with dirt and dust calls for the provision of suitable changing rooms, with baths (hot and cold water), as well as ordinary lavatory basins with towels and soap.

Mess-room accommodation and facilities for making tea or other hot drinks are much needed, and have in many cases already been provided by the companies who have substituted women for men.

As a few of the processes are solitary, and the nature of the work calls for the supervision of the health of the women by a woman, the presence of a forewoman or lady superintendent in the works is particularly desirable in this industry.

The District Inspectors and Lady Inspectors of Factories are ready to advise and assist employers in regard to health and safety or other points which may arise in connection with the introduction of women. The assistance of Employment Exchange Officers and the Local Advisory Committees (where any have been appointed) may be invoked in case of special difficulties as regards lodging and transit of imported workers and other local welfare problems.

PIT PRICES FOR COAL.

Instructions of the Controller of Coal Mines.

Last Tuesday there was issued from the Coal Mines Department of the Board of Trade the following letter, signed by Mr. Guy Calthrop.

Board of Trade—Coal Mines Department,
8, *Richmond Terrace, Whitehall, Sept.* 6, 1917.

COAL PRICES.

Gentlemen,—In view of the considerable diversions of coal which will take place under the operation of the "Coal Transport Reorganization Scheme," I think it necessary to issue definite instructions to the collieries in regard to certain questions as to prices which have from time to time been the subject of disputes between sellers and purchasers.

I do not suggest that any charge of profiteering can with reason be made against the great body of coal owners in the Kingdom. Complaints have, doubtless, been made that the prices authorized by the Price of Coal (Limitation) Act have been exceeded in certain cases; and, from inquiries which have been made, I think there is some foundation for this complaint. But where the excess complained of is small, I think it is very probable that the difference between the coal owner and the purchaser arises from the different constructions which have *bonâ-fide* been placed upon the provisions of the Act.

There are cases, however, which this explanation does not justify, and where the amount charged is in excess of what, upon any construction of the Act, can be justified. Where such cases have been brought before me, I have dealt with them; and I am prepared to deal with any cases of such a kind which may be submitted to me in the future. But I feel that it is also necessary that the whole position in regard to colliery prices should be clearly defined, with a view to avoiding disputes in future.

I do not propose to issue any official interpretation of clauses in the Act; but I feel that you will appreciate that I must take every means in my power to prevent any justification for a charge of profiteering in the coal trade whilst under my control. Accordingly, although the number of cases in which there is any material ground for complaint may not be large, I have decided—after consultation with the Chairmen of the Coal Owners' Associations and of the District Coal and Coke Supplies Committees—that, as the introduction of the "Coal Transport Reorganization Scheme" involves the cancelling of numerous contracts, all existing contracts for the sale of coal for inland consumption shall be abrogated as from the 10th of September, and in the re-arrangement of prices, the instructions which accompany this letter shall be carried out.

As I have said above, these instructions are not to be taken as official determinations of any provisions in the Price of Coal (Limitation) Act, but as instructions to the coal owners, who are, in effect, selling fuel on behalf of the Controller of Coal Mines.

The general abrogation of contracts, apart from the effect of the "Coal Transport Reorganization Scheme," is provided for by Article 2 of the Wholesale Coal Prices Order, 1917. It will be observed that it is specially provided that there shall be no interruption of deliveries; and I think that by this arrangement it will be possible to give effect to the review of prices with the minimum of inconvenience to the coal industry and to the business of the country generally.—Yours faithfully,

GUY CALTHROP.

[ENCLOSURE.]

Pit Price of Coal for Consumption in the United Kingdom.

INSTRUCTIONS OF THE CONTROLLER OF COAL MINES.

Dated the 6th of September, 1917.

1. An instruction has already been issued to collieries prohibiting the sale of coal for consumption in the United Kingdom, except at the maximum prices under the Price of Coal (Limitation) Act—Part 1 of the directions of June 28.

2. This instruction does not mean that the highest price which a colliery company obtained for a particular description of coal in the year ended June 30, 1914, is to form the basis for all future sales of the same description of coal; but merely that the price at which any sale is hereafter made shall exceed by the standard amount under the Price of Coal (Limitation) Act the price under a corresponding sale made on the corresponding date (or as near thereto as, having regard to the course of business, may be practicable) in the year ended June 30, 1914. In the case of sales under contract, comparison is to be made with a similar contract made on the corresponding date (or as near thereto as, having regard to the course of business, may be practicable) in the year ended June 30, 1914, not with a contract made before July 1, 1913, for delivery during the year ended June 30, 1914.

3. While it is not necessary in determining the corresponding price under the Price of Coal (Limitation) Act that in every case comparison should be made with sales to the same buyer, still it is clear that similarity of description, quantities, and conditions would more likely be found in the contract with the same buyer for a similar purpose and approximately on the same date in the corresponding period.

4. Where a buyer is asked to pay a price based, not on his own purchase at the corresponding time in the year ended June 30, 1914, but on a sale to another buyer, he may request to be furnished with such particulars of this sale (date, quantity, description of coal, and pit price) as will enable him to ascertain that it corresponds with the sale to himself.

5. No colliery shall: (*a*) Refuse to renew a contract for the purpose of obtaining a better price elsewhere. (*b*) Alter the conditions of supply (*e.g.*, free coal instead of contract) for the purpose of obtaining a higher price.

6. Where coal is diverted from one district to another, the price chargeable to the new customer is to be based on the prices which the supplying colliery is entitled to charge for the same description of coal in the new district—these being determined by reference to corresponding sales in that district on the corresponding date, or as near thereto as, having regard to the course of business, may be practicable, during the twelve months ended June 30, 1914, in accordance with the Price of Coal (Limitation) Act and these instructions.

7. Prices of washed fuel for inland consumption are to be regarded as subject to limitation, as in the case of prices of coal prepared by other processes, such as screening, picking, breaking, &c.

(*a*) Where the coal is washed by the colliery producing it, the price is to be the corresponding price in the year ended June 30, 1914, with the addition of the standard amount applicable to the colliery under the Price of Coal (Limitation) Act.

(*b*) If there is no such basis at the colliery, reference must be made to prices charged by other collieries in the district for similar fuel in the year ended June 30, 1914.

(*c*) In cases to which neither of the above methods can be applied (*e.g.*, where unwashed coal is conveyed to a washery from collieries under different ownership at a distance), the prices at the washery must not exceed those corresponding to the legal price of the unwashed coal at the pit's mouth, together with the actual cost of transport and reasonable charges for washing—such charges to include loss of weight in washing, cost of washing operations, and reasonable profit thereon.

8. The fact that a purchaser has offered to pay a price in excess of that authorized by the Price of Coal (Limitation) Act is no excuse for an infringement of the Act or of these instructions.

GUY CALTHROP,
Controller of Coal Mines.

Board of Trade—Coal Mines Department,
8, *Richmond Terrace, Whitehall.*

The Walsall Corporation Gas Committee propose to spend £254 on plant required to give a supply of gas to Corporation buses.

RETAIL PRICES OF HOUSE COAL.

Further Instructions of the Controller of Mines.

Under the Retail Coal Prices Order, 1917, which has been made by the Board of Trade at the instance of the Controller of Coal Mines, maximum retail prices of house coal throughout the United Kingdom are now to be definitely fixed. In view of the wide differences in the cost of coal in different localities, due mainly to transport charges, but partly also to differences in the maximum colliery prices and in local merchants' costs of distribution, the duty of fixing the maximum retail prices in each locality has, by arrangement with the Local Government Board, the Scottish Office, and the Irish Office, been assigned to the local authorities.

The basis on which the maximum prices are to be arranged by the local authorities is contained in the Order, Article 1 of which provides that the net profit from sales of coal delivered by road vehicle from a depôt or wharf or railway siding in lots of one ton or over shall not exceed 1s. per ton. This net profit includes all interest charges and salaries to owners, partners, and directors of the business, but not remuneration to owners of small businesses in respect of manual labour or clerical work performed by them. The local authorities are to meet the local coal merchants, and, after investigation of the figures submitted by them, are to publish in the local Press lists showing the prices chargeable under the Order for the various classes of coal sold in the district for household purposes.

In order to save the local authorities the trouble of investigations into costs in every locality, a detailed memorandum has been forwarded to each local authority embodying the results of a careful examination made by the Controller of Coal Mines of the position in a large number of localities in different parts of the country. As a result of this examination, it has been ascertained that in general (except in the case of sea-borne coal) retail prices should not exceed the prices in operation in the twelve months prior to the war by more than 6s. 6d. to 7s. 6d. per ton; the lower of these figures applying more particularly to towns in the neighbourhood of collieries. In certain cases, however, the increases over pre-war prices are less than these amounts; and in such cases there should be no increase in the present prices. On the other hand, in other districts an increase of more than 7s. 6d. per ton over pre-war prices may, owing to special circumstances, be justifiable. The local authorities have been informed that if the prices submitted to them by the merchants do not exceed the pre-war prices by more than the above amounts, they may be regarded as complying with the Order and may at once be published as the maximum prices for the district. If, however, the proposed increase over pre-war prices exceeds the appropriate amount mentioned above, the local authority are to request the merchants to furnish particulars of the increases in costs in order that the reasonableness of the prices which they suggest may be verified.

The provisions of the Order with regard to the fixing of prices do not apply to such parts of the areas of local authorities in the Metropolitan Police District and adjoining areas as are for the time being subject to the provisions of the Household Coal Distribution Order, 1917.

SHEFFIELD CORPORATION AND THE GAS COMPANY.

The report of the Directors of the Sheffield United Gas Light Company appointed by the Sheffield Corporation, for the year ended Aug. 31 last, states that the past year has been one of great difficulty and anxiety to the management of the Company. While the demand for gas for all purposes has been great and increasing, shortage of labour and the demands of the Ministry of Munitions have caused the supply to be maintained only with the greatest possible amount of extra work on the part of the staff generally; but the quality has depreciated and given rise to many complaints—as to the lighting, heat, and power of the gas produced. Naphthalene troubles have also been frequent. The whole of these complaints are due to the abstraction of essential ingredients which have been demanded by the Ministry of Munitions under the Defence of the Realm Act, rendering it impossible for the management to produce the quality which has been for many years equal to the usual standard required.

During the year the Company made an application to the Board of Trade to fix a calorific instead of a lighting standard; and though the application was opposed by the Corporation, the Order was granted. Details of it have already been placed before the Corporation.

In consequence of the increasing demand for gas for furnaces and power, the Company, late in last year, found it necessary to apply to Parliament for further capital and other powers. This was not contemplated by the Company when the last report was made. The Corporation lodged a petition against the Bill generally; and though the Company made the offer of several concessions (among others, a reduction of the amount of capital applied for) at conferences with the Corporation, no agreement was arrived at, and the Corporation opposed the Bill in Parliament. The result was that the whole of the capital powers were granted, and, with the exception that the sinking fund clauses (which the Company had been willing to withdraw) were struck out and coke-oven gas was not to be used for lighting purposes, the Company practically got all they asked for. No site for the proposed new works was able to be given; but this has since been obtained. A clause protecting the Corporation with regard to the opening of streets was settled by agreement, and inserted in the Act. The gas sold during 1916 shows an increase of 394,524,000 c.ft., or 7·97 p.ct., over 1915, although the receipts for public lighting were only £1988, as compared with £9001 in 1913, when the price was lower. The average price at which gas was sold during 1916 was 1s. 6·79d., as compared with 1s. 4·25d. in 1915, before the price was raised 6d. per 1000 c.ft.

During the year, many additions have been made to the plant, with a view of economizing labour and for the better production of gas; but on many occasions retorts have been standing idle in consequence of shortage of labour.

Substantial increases of wages have been made during the year.

The Company have no intention of making any parliamentary applications during the coming year, beyond the necessary application to the Board of Trade for a Provisional Order to manufacture gas on the new site (which is outside the City boundaries) and which was contemplated, and stated when the new Act was applied for.

In connection with this application, the Company may propose some modification of clause 36 of the Act (with regard to coke-oven gas), but will place their proposals before the Corporation at an early date.

SOUTH SUBURBAN GAS COMPANY'S PROTECTION CERTIFICATES WITHDRAWN.

Employers' and employees' applications were before the Lewisham Tribunal yesterday week, in regard to three members of the South Suburban Gas Company's staff—C. Ashley (31), ledger clerk; R. J. Fowler (29), ledger clerk; and W. J. R. Cooper (27), chief wages clerk. The cases had not previously been considered by the Tribunal; applications which should have come up on May 30 last having been withdrawn on the grant of protection certificates by the Munitions Area Recruiting Officer. All three men were rejected on offering themselves for service in November, 1915. Notwithstanding this, they were passed Class A by a travelling medical board which sat at Lewisham Town Hall on April 24 last.

The applications were on the ground that the men are engaged in work of national importance; the men also claimed on medical grounds. Mr. Wilfred Wastell, the Secretary of the Company, said these were the only three left on the staff who were Class A; and the Company felt that they were improperly classified. The Chairman (Mr. F. Mead) remarked that, the protection having been withdrawn, the Tribunal had to consider the claims on their merits, quite apart from the protected occupations scheme. Mr. S. E. Cockerton recalled that when the Company's cases were before the Tribunal he protested against the methods of the military. Men who had been granted exemption by the Tribunal were brought before them because they had these certificates, and the Tribunal withdrew the exemptions. It was a new dodge by the military authorities to get men into the army against the opinion of the Tribunal. The applicants produced certificates of private practitioners to the effect that they were unfit for military service. The Chairman said the Tribunal did not need to discuss whether exemption was necessary in the Company's interest until they knew the state of health of the men.

Consideration of the cases was adjourned, in order that the applicants might go before the Whitehall Medical Board.

A SHORT-LIVED STRIKE AT DONCASTER.

At Doncaster, the week before last, 269 men (members of the National Amalgamated Union of Labour, employed in several departments of the Corporation) handed in notices to cease work, demanding an advance in wages of 1s. a day. At a subsequent meeting of the Town Council, a Special Committee who had considered the demand recommended the Council to protest against the action of the Union in communicating with the Chief Industrial Commissioner before the Council had had an opportunity of fully considering the application. The Committee also recommended that no further advance be entertained at present, except in the case of the women labourers at the gas-works, who should have an increase of 2s. a week.

Negotiations were entered into; and it was understood that the notices would be suspended pending arbitration proceedings before the Committee on Production. It transpired, however, that the Special Committee had accepted some of the notices of the men employed in the highways and other departments; and on this becoming known, the men engaged at the gas-works decided to come out in sympathy. This they promptly did; but the gas supply was maintained by volunteers among the townspeople until the following day, when the strike was settled—the Corporation deciding that all the men out should be allowed to return to their work.

Complaints of Gas Pressure at Hammersmith.—Reporting to the Hammersmith Borough Council, the General Purposes Committee state that their attention has been directed to a number of complaints by residents in the borough of the low pressure of the gas supplied by the Brentford Gas Company. The Committee appreciate the restrictions and difficulties with which the gas undertaking is beset, but consider that the complaints should receive proper attention. They have accordingly made representations to the Gas Company which, it is hoped, will result in some improvement being effected in the pressure of the gas.

Shrewsbury Gas Company's Meeting.—A further small decrease in the consumption of gas was reported at the annual meeting of the Shrewsbury Gas Company, when a dividend making 5 p.ct. for the year was declared. The profit on the year's working amounted to £5267. The resignation was intimated with regret of Mr. T. F. Poole, who had been a Director for upwards of 25 years, and Chairman since 1909. Mr. J. B. Lloyd, who presided, said coal had cost £6014 more than in the year ended June, 1914, and wages £2392 more. The total expenditure was £12,863 more, though the quantity of gas made was the same. On the other hand, receipts were £10,738 more; and the difference of £2125 had to be made up. It was therefore necessary to increase the price of gas, for which an additional 2d. per 1000 c.ft. would be charged. This would also affect the proprietors by reducing the dividend from 5 to 4½ p.ct. Replying to a vote of thanks, Mr. William Belton (Engineer and Secretary) remarked that, though times had been very difficult, he was afraid they would be more difficult yet.

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

Half-Yearly Report.

The report of the Directors for the half year ended June 30 last states that the accounts show a profit on the revenue account of £41,435; and, after providing for interest on debenture stock and temporary loans, there remains the sum of £32,851, to which must be added the sum of £2502, credit from income-tax account, making a total of £35,353.

The Directors recommend the declaration of the maximum statutory dividend on the consolidated ordinary stock of the Company, which, owing to the increase of 6d. per 1000 c.ft. in the price of gas, has been reduced to the rate of 4¾ p.ct. per annum, less income-tax. This will absorb the sum of £33,947, after which a balance of £1405 will remain to be carried to the next account. The costs of coal, oil, freight, and all materials continue to show abnormal advances over pre-war times; but the Directors feel confident that the shareholders will be gratified at the substantial increase in the quantity of gas sold and the results of the half-year's working.

The statement of gas made indicates 813,485,000 c.ft., including 253,366,000 c.ft. of carburetted water gas. The total quantity of gas sold was 705,911,000 c.ft.—public lighting, 18,327,000 c.ft., and private lights per meter, 687,584,000 c.ft. The quantity used at the works was 18,091,000 c.ft.; the quantity accounted for being 724,002,000 c.ft., and that unaccounted for 89,483,000 c.ft. The number of public lights was 4734. In the matter of residual products, it is estimated that there were in store on Dec. 31 last 1612 tons of coke, 178 tons of breeze, 171,989 gallons of tar, and 75,399 gallons of ammoniacal liquor. During the half year the quantities made were: Coke, 30,284 tons; breeze, 7152 tons; tar, 482,960 gallons; and ammoniacal liquor, 904,656 gallons. There were used in manufacture in the half year 12,619 tons of coke, 3856 tons of breeze, and 687,101 gallons of ammoniacal liquor. The quantities sold in the half year were: Coke, 18,380 tons; breeze, 2996 tons; tar, 535,869 gallons; and ammoniacal liquor, 108,025 gallons—which latter, it is noted, was lost through the bursting of a tank. In store at the end of the half year were, as estimated: Coke, 897 tons; breeze, 478 tons; tar, 119,080 gallons; ammoniacal liquor, 184,929 gallons.

The Company are now urging, as a new industry worthy of attention in Ireland, the system of fruit and vegetable drying by means of gas; and a pamphlet on the subject has been in large demand from the new distribution department in Hawkins Street. This department, with its spacious demonstration hall, has fast become a centre of great attraction to all classes of customers and to visitors from the provinces.

LEA BRIDGE DISTRICT GAS COMPANY.

New Vertical Retort Installation in Satisfactory Operation.

The Half-Yearly Meeting of the Company was held on Tuesday last, at the Offices, Nos. 63 and 64, Chancery Lane, W.C.—Mr. A. M. PADDON, M.Inst.C.E. (the Chairman), presiding.

The SECRETARY (Mr. Richard Sandell) read the notice convening the meeting; and the report and accounts were taken as read.

The CHAIRMAN said he did not think that careful perusal would reveal anything to materially qualify the very satisfactory character of the statement presented. There had been in the six months ended June 30 an increase of nearly 17 p.ct. in the quantity of gas sold, as compared with the corresponding period of 1916; and since the accounts were prepared, this increase had continued in an even greater degree. As to the accounts, it would be seen that the capital stock remaining to be issued for the purposes of this rapidly growing business amounted to only £8710; but the Directors had anticipated matters in this regard by obtaining an Act during the current session, by which they had power to issue £200,000 more. In the same way, the debenture stock remaining to be issued (£17,624) was increased by £66,000. In addition, the amount authorized to be issued as debenture stock under the old Acts had been increased by £20,000. Thus there was an addition of £300,000 to their capital powers by virtue of the new Act. This was very satisfactory, inasmuch as the Act was secured by treaty, and did not involve them in the expenses of opposition. The capital expended per million c.ft. of gas sold was now £528, which, considering the size of the undertaking, was a very good figure indeed. They had during recent years gained ground steadily in this direction. Only £2476 had been spent on capital account during the past six months; and there had been written-off as depreciation £3658. Coming to the revenue account, there was an important increase in the sum paid for coal—amounting to nearly £8000; but, of course, the greater quantity of gas made had a good deal to do with this. Really, the cost of the coal was about 50 p.ct. in excess of what the Company paid before the war. Oil, which they used as sparingly as possible, had increased by over 200 p.ct., which was putting it at a very moderate figure indeed. Maintenance charges had been well kept up. Their carbonizing wages worked out at 1·94d. per 1000 c.ft., which was an uncommonly good figure. In comparing figures of this kind, it had to be remembered that some of them were favourable as wages, simply because bonuses to a disproportionate extent had not been brought into the account. Some companies had increased their wages and paid a bonus; and others had paid bonuses and left the wages alone. In their own case, they had very materially increased the wages of their men. Law charges £1059 had been incurred mainly in connection with their new Act. The war bonus on wages for increased cost of living, without considering the increase in wages to which he had referred, came to more than 1d. per 1000 c.ft. They were selling gas at 3s. 3d. per 1000 c.ft.; and, so far as could be seen, there was every reason to anticipate that this figure would not be increased, at all events before the next meeting. Gas and meter rental had brought in just over £9000 more; the total receipts being £13,383 up. Against this, the expenditure was £11,305 more; the profit thus being larger by about £2000. There had been brought into the profit and loss account £5629; and they were carrying forward to next account £6767. After paying the dividend, which had been maintained at the highest rate that they had paid, they had increased the carry-forward by £1138. They began the present six months with what constituted a very good start; and he did not think there was any particular danger to be pointed out as threatening them. What success had been achieved was the more meritorious, because they had had a newly-constructed works to deal with. The installation of Glover-West vertical retorts was in perfectly satisfactory operation. The results were quite commensurate with what was anticipated; and the facilities offered with regard to labour saving were also satisfactory. These new appliances and new methods brought with them changes in reference to manufacture which needed careful noting, and required some adaptation to the peculiarities of existing practice.

LOW-TEMPERATURE CARBONIZATION.

He sometimes thought in these days that the education in carbonization had not been very good in the past of some of those who advised them rather hurriedly in the matter of changes. He had been very much struck with the suggestion thrown out broadcast that they might with advantage hurriedly transpose the system of carbonization with high heats and high yields to one of low temperature. This bespoke the untrained or the insufficiently trained mind; and to him, from the very beginning, the whole thing seemed replete with danger. The one thing they dreaded in the old days was being forced back to low temperature against their will. Sometimes they had had to make large volumes of gas at very short notice, and it had been necessary to alter the six-hour charges then prevalent to four-hour ones, getting the extra gas by thus rapidly filling and emptying the retorts. A more wasteful, mischievous, deleterious way of working could not be conceived. It meant the absolute ruin of their works economy. He was therefore astonished when he saw it hastily advocated as an expedient to meet current difficulties of the day. There was only one thing to be said of it—that it was rather more hurriedly withdrawn than it was put forward. This was the most decent sort of apology that could be made for the proposal. Had the advocates of low-temperature carbonization realized what the effect was going to be on the coke? The coke that was made in this way would be almost impossible to transport, because of its friable character, and the loss whenever it was touched. This loss was quite enough nowadays when one had to deal with Yorkshire coals. He could not help thinking that whoever was responsible for the proposal could not have seen much of the inside of a retort-house. The Company had their own technical problems; but they had very good technical officers to grapple with them, and a Board which, if it had no other merits, would not lightly adopt ill-timed and ill-considered proposals. He concluded by moving the adoption of the report and accounts.

The DEPUTY-CHAIRMAN (Mr. G. W. Carey) seconded the motion, which was unanimously agreed to.

Proposed by the CHAIRMAN, seconded by Mr. A. F. PHILLIPS, dividends were declared, less income-tax, at the rates per annum of 5 p.ct. on the preference stock and 6¼ p.ct. on the ordinary stock.

The meeting concluded with a hearty vote of thanks to the Chairman, Directors, Engineer and Manager (Mr. F. W. Cross), the Secretary, and other officers, which was acknowledged by the CHAIRMAN.

ILFORD GAS COMPANY.

Moving the adoption of the report and accounts for the half year ended June 30, at the meeting of the Ilford Gas Company, the Chairman (Mr. William Ashmole) said the sale of gas for the six months showed an increase of 2·75 p.ct. on the quantity sold during the corresponding period of 1916. After providing for the interest charges and writing-off certain obsolete plant, the balance of the profit and loss account available for dividend was £21,057, out of which sum the Directors recommended a dividend for the half year at the rate of 7 p.ct. per annum on the "A" and "C" stocks, and 5¼ p.ct. per annum on the "B" stock, subject to the deduction of income-tax. These payments would leave a balance of £14,663 to be carried forward. In consequence of a further rise of approximately 50 p.ct. in the cost of gas oil, and of another considerable increase of the war bonus paid to the employees, the Directors had been compelled to increase the price of gas to 3s. 5d. per 1000 c.ft. from Midsummer last. This increase in the price of gas, while regretted by the Board, was quite unavoidable. The war bonus paid by the Company, together with the war allowance to employees serving with the Forces, represented almost 3d. per 1000 c.ft. The analysis of coal and oil, including dues, carriage, unloading, &c., showed that the cost of gas per 1000 c.ft. equalled 2s. 2·70d., against June of 1914, when the same items represented 1s. 6·65d., an increase of over 8d. per 1000 c.ft., which, added to the 3d. above referred to, made a total of 11d. per 1000 c.ft., exclusive of the extra cost of all other materials. Receipts had also increased, but not in the same proportion. The total receipts per 1000 c.ft. of gas sold for this half year equalled 4s. 5·96d.; whereas in June, 1914, they were 3s. 8·06d.—giving an increase of 9·9d. They had not yet reached top figures in this balance-sheet for labour, material, and other outgoing expenses, several of which items had only been at their present high figure for part of the period under review. Conditions had not improved since last they met. If anything, they had become more serious, particularly with regard to the supply of material and the difficulty of securing the necessary labour to carry on the work. One of the new extensions was a breeze washer, intended to separate the coke from the boiler-clinker and retort-fire ashes, so that it could again be used as boiler fuel or for other purposes—the resultant clinker being a very fine material for concrete making. Another extension was the fixing of a gas-boosting plant, to enable them to raise the pressure on the district mains when necessary. A third extension going on at present was the completion of a 24-inch main, connecting-up the new scrubber-washer section with the purifiers. This will enable them to get the new section put to work for the coming winter. The scrubber-washers themselves had been com-

pleted for some time; but the final connecting-up has been delayed, due to the present circumstances of labour and material. The benzol recovery plant had been in operation for some months. It had been erected by themselves from second-hand material, and had been highly commended by one of the Government Inspectors as being most efficient. The Explosives Department gave them credit for erecting the whole plant with their own material and men, knowing that, had they depended upon a new plant from one of the makers, it was a question as to whether the material would have been delivered by this time. This was extremely creditable to their Engineer (Mr. W. B. Farquhar). In connection with the carbonizing department, the coal elevating plant was being extended, and a new tar-main and tar-tower erected for one of the inclined retort-benches. The stocks held by the Company in the various goods required, not only for the works but for district use, were very good.

The report was adopted, and the dividends recommended were declared.

Replying to a vote of thanks, the Chairman said that personally he did not think gas companies had been treated fairly by the Government. They called for certain material which they required, but did not give the undertakings any assistance in producing it.

LINCOLN GAS-WORKS' ACCOUNTS.

The accounts of the Lincoln Corporation Gas-Works for the year ended March 31 last show an income of £68,307, and a gross profit of £14,237; the net profit being £6269. Expenditure increased by £8897, owing to the high price of coal and material of all kinds, labour, increased income-tax, and heavier charges for maintenance and repair of works, plant, and mains. Compared with the expenditure in 1913-14, there is an increase of £14,255. The income increased by £9588 compared with last year, and £12,924 in 1913-14.

The price of gas was raised 3d. per 1000 c.ft. from April, 1915; and a further increase of 3d. took effect during the last quarter of 1915-16. The discontinuance of street lighting resulted in a further reduction during the year in the demand for that purpose, and over 30 million c.ft. compared with 1913-14. Private consumers took 8 million c.ft. more during the year; and the demand for power purposes increased by a million c.ft. during the year. The net result is an increase of 15 million c.ft. compared with last year, and a reduction of 8 million c.ft. compared with 1913-14. Residuals realized £4315 more.

The annual report of the Gas Manager (Mr. W. H. Mainwaring) states that the make of gas shows a considerable advance both on 1916 and 1915, and nearly reaches the maximum figure of 1914. The greater part of this increase was made during the spring of 1917. Carburetted water gas was manufactured only during those months of the winter when the coal-gas plant was inadequate to cope with the requirements of the city; and the stock of oil in hand at the commencement of the year was sufficient to meet necessities over this period. No new mains were laid during the year; and the number of new consumers added was fewer than for many years past. Owing to the difficulty of obtaining meters, cookers, and the necessary pipe and fittings, together with their greatly advanced cost, it has not been possible to carry out many of the orders in hand; and this will undoubtedly occasion inconvenience during the ensuing season. There has been a remarkable increase in the number of fractured mains, due presumably to the exceptionally heavy traffic, in conjunction with the severe weather; and the quantity of gas lost was accordingly greater than for several years. Coke has been, and is, in such request that it has been imperative to restrict its use so far as is possible to purposes for which it is essential. Sulphate of ammonia has also been in great demand; and the quantity made was not nearly sufficient to meet all the requirements.

PADIHAM GAS-WORKS DEFICIT.

In the course of his annual report, Mr. A. J. Harrison, the Gas Engineer and Manager to the Padiham Urban District Council, states that there has been a decrease in gas made of 2,812,796 c.ft., and of 4,635,558 c.ft. in the gas sold. The latter figure was equal to about 5·7 p.ct. when compared with the previous year. The decreased consumption, when compared with 1913-14, was equal to 10·5 p.ct., almost one-half of this being due to the restricted public lighting. The department was fortunate in carrying a satisfactory stock of coal during the year, although the quality was much below that supplied during pre-war times. Deliveries had not been as satisfactory; and the question of obtaining adequate supplies of suitable coal for the coming winter's requirements was a matter of much anxiety. The condition of the coke market had been fairly good, there being a steady demand throughout the year; and realized prices showed satisfactory increases when compared with the previous year, but not sufficient to meet the increased cost of coal and labour. Further experiments had been made with vertical retorts, with fairly satisfactory results. The alterations to the heating of one of the settings, sanctioned by the Committee, had, however, delayed the completion of the final tests.

The cost of public lighting during the year was £121, against £491 for 1915-16, which, while resulting in a considerable saving on the district rate, was a loss of revenue to the department. The average annual cost of public lighting during pre-war times was about £1100. The revenue expenditure and income during the year was £13,451 and £16,983 respectively, leaving a gross profit of £3532. The net revenue account, after allowing for interest &c., showed a deficit of £1247. The expenditure showed an increase of £1038 over 1915-16, the principal items being in respect of the new show-rooms, retort renewals, wages, rates, and taxes. There was a total decrease in revenue of £429 compared with 1915-16. The increase in the rates

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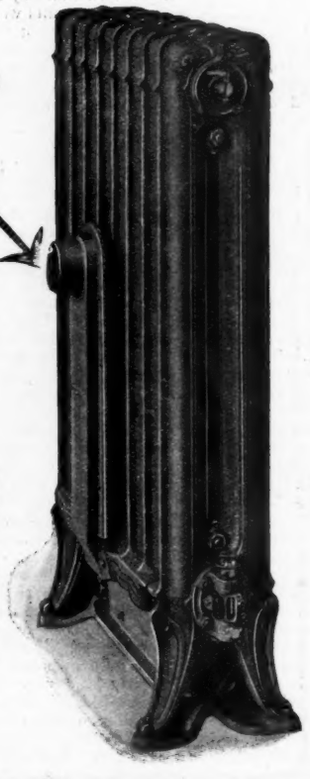

"Richmond" Ventilated (Gas Steam) Radiators meet every condition stipulated by the Home Office for the hygienic heating of Factories, Workshops, &c., and the simplicity of fixing, economy in working, ease of temperature control, and saving of labour are powerful arguments in their favour.

A LARGE FIRM OF ENGINEERS WRITE: March, 1917.

"We would like to say that during the recent severe weather, our Works were kept just the proper temperature with the lay-out of Radiators which you suggested and which we adopted. Although we were working night and day, we did not have a single complaint as to the place being too cold."

Our knowledge and experience are placed at your disposal to co-operate on any enquiry for heating by Gas Steam, White Light, or Hot Water Radiators from central boiler.

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charged for gas was equal to about 5 p.ct. It became increasingly difficult each year to forecast with any accuracy the estimates of the department, especially in regard to gas consumption, upon which the items of income and expenditure were based. It would have been possible, had the consumption remained at the figure for 1913-14, to have met the capital charges on the undertaking without having to increase the price of gas at all, even with the advances up to the present in material and wages. There would appear to be every indication of a substantial increase in the consumption during the present year. If the consumption continued to increase at the present rate throughout the year, there were reasonable grounds for assuming that the department would finish the year with a "straight edge" at the present rates charged for gas. But if there was a falling-off in consumption through the coming winter, the Committee would require to reconsider the prices charged. A perusal of the analysis showed that during 1915-16 the net cost of producing and delivering gas to the consumers' meters at Padiham was 16·64d. per 1000 c.ft. sold; while the average for 73 leading municipal undertakings was 17·96d. During the year 1916-17 the cost had increased to 18·10d.; and while not being able to compare this figure with the same undertakings this year (the published figures not yet being available), a comparison with sixteen large gas companies just published showed a difference in favour of Padiham of no less than 10·60d. per 1000 c.ft. Taking the working and financial results throughout, he was of opinion that, even with the reduced output, the department was manufacturing and distributing gas at a figure which would bear favourable comparison with the largest undertakings.

High Wycombe Gas Company.—The accounts of the High Wycombe Gas Light and Coke Company, Ltd., showed a profit on the operations during the first half of the present year amounting to £1419; and adding to this the balance brought forward and bank interest, there was a total of £4561. Out of this it was decided to pay dividends at the rate of 10 p.ct. per annum on the original shares and 7 p.ct. per annum on the additional shares, leaving a balance of £3139 to be carried forward.

Dover Gas Company.—An increase of 8 p.ct. in consumption, as compared with the corresponding period of last year, was announced at the half-yearly meeting of the Company, when the Chairman (Mr. W. Mannering) said that, should no unforeseen circumstances arise, they might expect the revenue of the current half year to be sufficient for the next dividend. The net profit of the past six months amounted to £1837; and a dividend was declared for the half year at the rate of 7½ p.ct. per annum, less income-tax, which will reduce the undivided profits by £975. Sixty of the employees have joined the forces; and cordial acknowledgment was made of the loyal way in which the officers, staff, and workmen have served the Company in the trying period passed through.

COAL GAS AN ALTERNATIVE TO PETROL.

A FORTHCOMING DEMONSTRATION IN LONDON.

[From the "Light Car and Cyclecar."]

Looking round for a substitute [for petrol], it is apparent that it will be a long time before the steps taken by the Government to develop home-produced fuels will materialize. There is very little possibility of the price of petrol being controlled; and if ever it were, we fear that we should merely retain the present price as a maximum, without any reduction. Liquid substitute fuels are banned. We can see but one alternative, and that is coal gas. The use of coal gas for private vehicles is making great strides. When we consider that 1000 c.ft. of gas costing (say) 3s. will do the work of 4 gallons of petrol costing 16s., the difference in running costs is so enormous as to make it perfectly apparent that the relative expense of the additional fittings and the gasholder is very slight. Let us place the difference in running costs as low as 12s. for every 4 gallons of petrol used, equivalent (say) to 150 miles running for a light car. Therefore, 3000 miles running will more than cover the cost of fitting a gas-bag, while it would render us independent of the restrictions on petrol supplies. We know its use entails some trouble to fit up a container; that to fit a container means an initial outlay of anything from £8 to £16; that the flexible gasholder is unwieldy and unsightly; that with it we can only run short distances, 15 to 30 miles; but still we must be thankful to run at all. It is argued that coal gas will be dropped after the war, or as soon as the price of petrol comes down. That may be a long time yet, and meanwhile it would enable us to run a car which we could not do otherwise. Furthermore, the development of coal gas will act as a powerful menace to the petrol interests, and check increased prices of motor spirit, in exactly the same way as the popularity of benzol before the war checked the manipulations of the petrol concerns. Coal gas is now making very great development; and at the end of this month a demonstration will take place in London of a number of vehicles which have been fitted up to run on it.

COAL GAS FOR BOILER FIRING.

The following table gives results of some tests of coke-oven gas, as compared with coal, used for firing a Stirling water-tube boiler, as published by Mr. A. W. Morgan in the "Electrical World." The gas was a first-run quality, averaging over 600 B.Th.U., and was delivered from fire-clay nozzles to play upon a bed of incandescent coal or fire-brick broken to egg size. The figures show that mixed coal and gas is 8, and

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gas alone 21 p.c. more costly than coal; but the actual costs of coal and gas are not stated.

	Coal.	Coal and Gas.	Gas.
Coal used per hour, lbs.	4374	..	..
Equivalent in lbs. of coal per hour	..	1,278	2,006
Gas burned per hour, c.ft.	..	29,163	47,785
Equivalent in lbs. of coal per c.ft. of grate surface	37·8	49·4	17·45
Ash and refuse, p.ct. of total coal	18·9	21·4	..
Temperature of flue gases leaving boiler (deg. Fahr.)	640	683	517
Draught over fire—inches of water	0·36	0·29	0·03
,, under outlet damper	0·92	0·82	0·06
Efficiency of boiler, grate, and furnace, p.ct.	61·4	61·6	73 0
Efficiency of boiler and furnace	66·1	68·9	73 0
Combustible matter in ash—p.ct. total coal by weight	8·8	11·7	..
Cost to produce 1000 lbs. steam from and at 212° Fahr. in cents.	11·6	12·6	14·1
CO in flue gas, p.ct.	10·43	12·37	6·75
O ,, ,,	10 50	4·85	7·85
N ,, ,,	79·07	82·78	85·40
	100·0	100·0	100·0
HEAT BALANCE-SHEET.			
Heat absorbed by boiler	61·4	61·6	73·0
,, loss by moisture in coal	0·3	0·3	..
,, ,, hydrogen in coal and gas	4·1	6·2	12·6
,, ,, dry flue gases	16·9	13·7	9·6
,, ,, unconsumed carbol in coal	9·5	9·8	..
,, ,, apron water	0·7	0·6	0 1
,, unaccounted for	7·1	7 8	4 7
	100·0	100·0	100·0

NEED FOR SMALLER GAS LIGHTING UNITS.

In the course of a communication to the "Gas Age" [New York], the writer comments on the fact that many gas undertakings confine their selling operations chiefly to large units, consuming 10 c.ft. of gas per hour and upwards, and entirely neglect the extensive demand for small light centres, with the result that a large portion of the lighting is left to the extravagant and unsatisfactory flat-flame burner—a fact greatly in favour of other competing lighting agents. When these once obtain a footing, they may be successful in securing the whole. Surely it is better to give an all-round satisfactory service with gas, even at a slight loss on the smaller units, which may perhaps not use sufficient gas to cover the cost of maintenance, than to allow a large part of the lighting business to fall away by default. But the difficulty is that, owing to the neglect above named, there are no small incandescent burners on the market. If a salesman seeks to displace a small flat-flame burner, he has nothing less than a 40-candle unit or so to offer. It is quite practicable to manufacture either upright or inverted incandescent burners down to (say) 5 c.p.; and there is a good market for such small burners

Many factories and warehouses for this reason retain the flat-flame where a small light is required; and the writer instances as an example a worsted yarn factory, formerly lighted entirely by flat-flames. Some few years ago they replaced a number of these by twenty-one No. 30 Humphrey high-power incandescent burners; but as these were not suitable for narrow passages and other places where a large light was not required, many of the old pattern were retained. The new burners were supplied by the Gas Company on hire-purchase maintenance terms, and were so far satisfactory that after a time the consumer agreed to entirely displace the flat-flames, and for forty-five Radio-X burners to be furnished on similar terms, to be paid for at the rate of 1s. 6d. per month for eighteen months, when they would become the property of the purchaser. No maintenance charges were made during the summer, when the light was not required. The installation now comprises the twenty-one three-mantle high-power lamps, five single-mantle, and forty-five Radio-X, all maintained by the Company; and it is open to the consumer either to undertake his own maintenance or to arrange with the Company to do so, when the whole becomes his property. While accepting this arrangement, the consumer complains that in many places the Radio-X give much more light than is necessary, and that with smaller units he could get equally satisfactory results, with an appreciable economy of gas.

Lighting of Lye.—The District Council of Lye (Worcestershire) have decided to give the Gas Department of the Stourbridge Town Council six months' notice to terminate the public lighting contract. This drastic step has been taken by Lye after many protests against the refusal of the Stourbridge Gas Department to reduce by £10 the charge of £160 made by them for the unlighted lamps in the urban district.

Coal Gas as Motor Fuel.—The Limavady (co. Londonderry) Urban Council have decided to grant an application for a supply of coal gas for use as motor fuel, in connection with a new motor-bus service between the town and Londonderry City. It was stated the firm would require at the Limavady end about 200 c.ft. of coal gas each journey, or from 400 to 500 c.ft. per running day, and that arrangements had been made for a supply at Londonderry as well.

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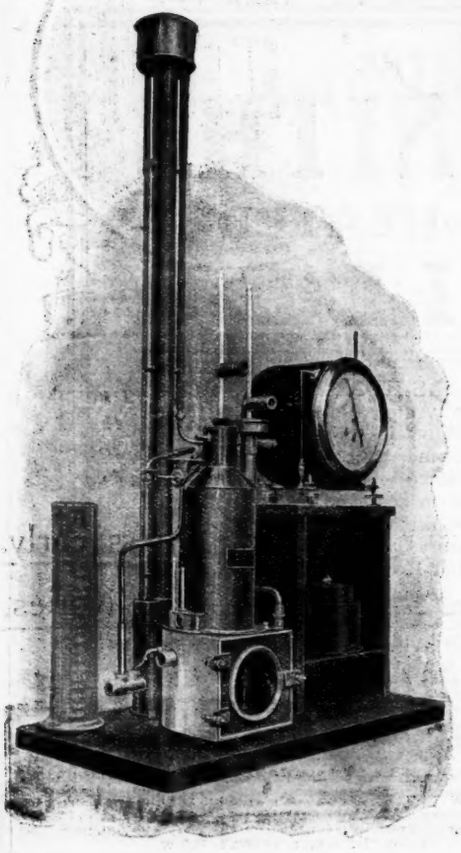

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It automatically prevents low results due to differences in humidity, inlet and outlet air temperature, and varying inlet water temperature, which are difficult to avoid with ordinary calorimeters.

SIMPLE AND ACCURATE.

SOLE MAKERS—

ALEXANDER WRIGHT & CO.,

LIMITED,

WESTMINSTER.

Agents { Australia: FYVIE & STEWART, 360, Collins Street, Melbourne.
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CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Sept.* 17.

The London tar products market remains without marked change. Orders have recently been issued bringing transactions in tar and light oils under the control of the Government from the 1st of October; so that the range of products for which there is still an open market is narrowing. Pitch continues firm, and inquiries are still being received for export; makers' price being not below 45s. net per ton f.o.b. works. There is no change to record in the values of other products.

Orders continue to be received for sulphate of ammonia for home agricultural purposes, for both prompt and forward delivery, under the Government scheme of prices.

Tar Products in the Provinces.

Sept. 17.

Markets for tar products remain about the same. Pitch keeps steady. Solvent naphtha is slightly better.

The average values for gas-works products during the week were: Gas-works coal tar, 23s. 3d. to 27s. 3d. Pitch, East Coast, 17s. to 18s. per ton; West Coast—Manchester 17s. 6d. to 18s. 6d., Liverpool 17s. 6d. to 18s. 6d., Clyde 18s. to 19s. nominal. Benzol, 90 p.ct., North, 10½d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6½d. to 6¾d. [In the "JOURNAL" for Sept. 4, the price of this article was inadvertently given as 6¾d. to 7¼d. The quotation should have been 6½d. to 6¾d.] Solvent naphtha, naked, North, 2s. to 2s. 1d. Heavy naphtha, North, 1s. 1d. to 1s. 2d. Creosote, in bulk, North, 3½d. to 3¾d. Heavy oils, in bulk, North, 3¾d. to 4¼d. Carbolic acid, 60 p.ct., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1¼d. to 2d.

FROM A MARKET CORRESPONDENT.

Tar Products.

Rather more activity has been reported in the market during the past week. The Continental demand for pitch is maintained, and, shipping facilities remaining relatively favourable, the price continues at about 48s. per ton, with a tendency towards a higher figure. The Provincial position remains unaltered, except that stocks are accumulating. Nevertheless, makers look hopefully to the future, and feel quite safe in refusing current offers. How long they will maintain this attitude it is impossible to say; but, if present conditions regarding shipping facilities continue, a position of some difficulty will result. There is a large inquiry for solvent naphtha in big lots; but the supply does not appear to be equal to the demand. The market has, consequently, become very firm; and up to 2s. 6d. per gallon has been paid. Crude benzol and dehydrated tar are to be controlled from the 1st prox., and considerable inconvenience is already being created by the system of licences required before business can be done after that date. Creosote remains nominal. Cresylic acid—one of the few products in which there is a free market—is better again on an increased demand. Naphthalenes also are good, and quotations remain firm. The lower qualities of crude are in special request for the firelighter industry, and higher prices may be expected. Aniline oil is quiet and carbolic acid unchanged. In other products there is nothing of particular interest to record. The range of quotations is as follows:

Aniline Oil (pure): 1s. 3d. per gallon.

Benzol: 90% London, 1s. 0½d., North 10½d. to 11½d.; 50% North 1s. 3½d. to 1s. 4½d. naked per gallon.

Carbolic Acid: 60% East and West Coast 3s. 4d. per gallon; crystals 40%, 1s. 3d. per lb.

Crude Tar: London 28s., Midlands 23s. 6d.; North 24s. per ton, *ex* works.

Pitch: London 48s. f.o.b.; East Coast, 18s. to 20s. f.o.b.; West Coast—Liverpool and Manchester 18s. 6d. to 19s. 6d. f.a.s., Clyde 20s. per ton.

Solvent Naphtha: Naked London 90-190% 1s. 8d. to 1s. 9d.; North 1s. 3d. to 1s. 4d. per gallon; 90-160% naked London 2s. 4d. to 2s. 5d.; North 2s. 3d. per gallon.

Crude Naphtha: Naked 30% 8¼d. to 8½d.; North 6½d. to 6¾d.

Naphthalene: Refined £25 to £30; salts 80s., bags included.

Toluol: Naked, London 2s. 4d.; North 2s. 3d.

Creosote: Nominal, London 4¼d.; North 3¾d.; heavy oil 4½d. per gallon in bulk.

Anthracene: "A" quality, 40-45%, 4½d. per unit; "B" quality, 1¾d. to 2¼d.

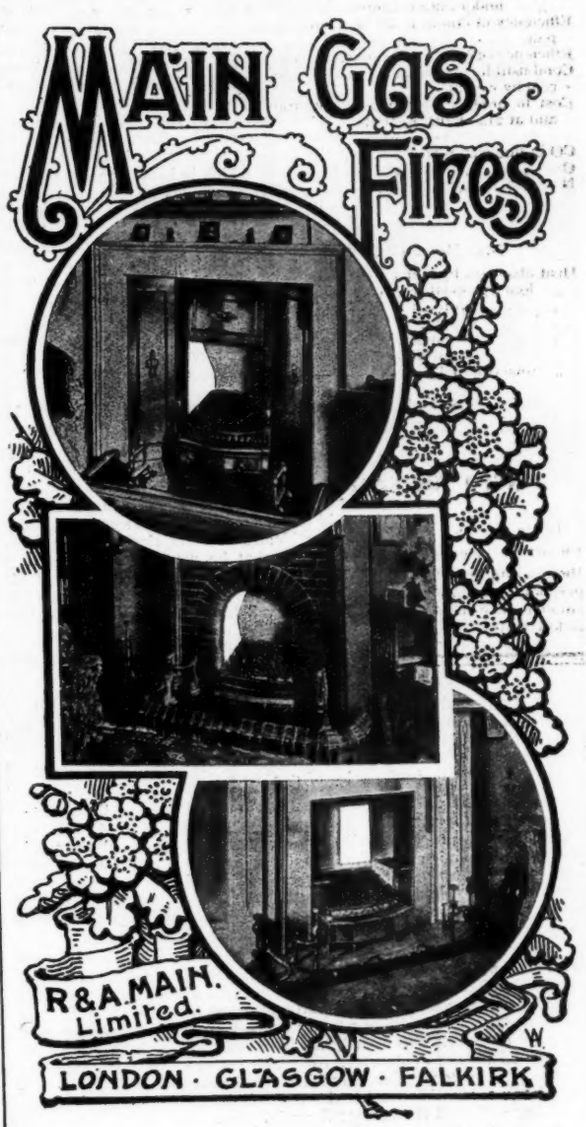
Cresylic Acid: 95%, 2s. 5d.; 97-99%, 2s. 6d. to 2s. 7d.; Glasgow 2s. 2d., *ex* works London and f.o.b. other ports.

Grease Oils 18° Tw. (naked), £6 per ton f.o.r. makers' works.

Sulphate of Ammonia.

During the past month just over 7000 tons of sulphate have been exported; the average price being about £21 per ton. This quantity is very considerably less than the average monthly exports of normal times; and, in view of the very strict control being exercised, there seems little chance of any improvement in the export trade. There are also considerable misgivings regarding the outlook for this part of the trade after the war. At the present time by far the greater bulk of the output is going to supply the home agriculturist; and the coming season will witness a greatly extended use of the fertilizer. The automatic rise in the quotation next month will probably be without effect on the demand, as farmers have been forewarned for some time. Fortunately, there is some probability that the home trade will continue to increase, and so make good to a fair extent the loss in export trade

MAIN'S NEW FOLDER IS READY.



Supplies of this handy List will be sent upon application. It contains the latest information and prices of the popular "Main" Fires, Radiators, &c.

Place your Season's Orders early.

We have commenced our deliveries.

R. & A. MAIN, Ltd.,

WORKS: Gothic Works, EDMONTON, N.; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.

SHOW-ROOMS AND BRANCHES: 25, PRINCES STREET, OXFORD CIRCUS, W.; 82, Gordon Street, GLASGOW; 83, Old Market Street, BRISTOL; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

that is now going on. Very little has been released for shipment during the past week. The export price remains at about £24 per ton. In America, the demand for both domestic and foreign account continues unabated, and prices are rising again.

Quotations (basis 25 p.ct., double bags): Home trade: September, £15 7s. 6d.; October-December, £15 15s.; January-May, 1918, £16 7s. 6d.—all delivered, less 10s. per ton at makers' works.

Export (under licence only): London, Leith, Liverpool, and Hull, £23 10s. to £24 10s. f.o.b.

COAL TRADE REPORT.

Northern Coal Trade.

There is a good demand for coal; but the new regulations for distribution are in some degree interfering with the trade, and with the supply of wagons. It is hoped, however, that a week or two will make the working smoother. In the steam coal trade, the demand for best kinds is full; but that for second qualities is only moderate. Best Northumbrian steams are 30s. per ton f.o.b.; for second-class qualities, about 25s. 6d. is the current quotation; and steam smalls are very plentiful, and are still from 18s. 6d. to 20s. 6d. The gas coal trade is also a little disturbed temporarily by the restriction in the area of the distribution; but the demand is normally increasing at the present time. The trade done by sea, which is heavy, is not affected; while the well-known excellence of Durham gas coals causes preference to be given especially to the higher qualities. Best Durham gas coals are about 25s. per ton f.o.b.; second-class descriptions are quoted at 23s. 6d.; and "Wear Specials" are from about 27s. 6d. to 30s., with a full demand. Freight on gas coal is firmer; the supply of steamers being inadequate. The rate quoted is about 19s. to 20s., Tyne to London. To neutral countries, freights are at record heights. In coke, the local demand is higher; but the production is also increasing. Good gas coke is from 29s. to 31s. f.o.b. in the Tyne. Coke freights are high; 46s. having been paid to the northern ports of France.

Strike at Aberdeen.—A strike of gas-workers at Aberdeen, involving 300 employees, necessitated the calling in of a number of volunteers. Eventually it was agreed to refer the question to Sir George Askwith, and that the workers should meanwhile return to their employment.

A Tribunal's Exemptions.—At the Southwark Tribunal last week the Military Representative said he had received the latest instructions with reference to men holding certificates of exemption under the protected trades schedule. These were that he was not to oppose any application to the tribunal for the exemption of a man who had his protection certificate withdrawn, so long as the application was made within seven days after he had received his calling-up notice to join the army.

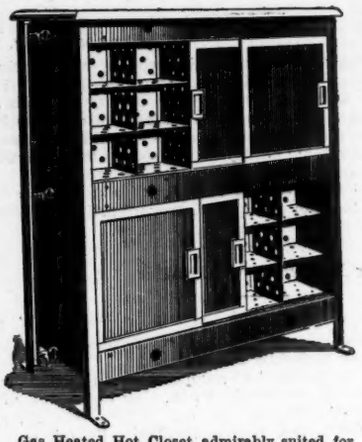
Effect of High Wages at Ossett.—At a meeting of the Ossett Town Council last week, the Mayor, speaking for the Gas Committee, reported that, in the twenty-one weeks of the current financial year, the cost of wages and war bonuses in the Gas Department had been £565 more than in the corresponding period of last year. At this rate, the cost for the present year, as a whole, would be about £1300, and was likely to absorb the whole of the extra revenue produced by the advance of 3d. per 1000 c.ft. in the price of gas.

South Staffordshire Mond Gas (Power and Heating) Company.—The assent of the shareholders is asked to the raising of £205,000 of "prior lien debenture stock." In order that the present plant may be enlarged, the Ministry of Munitions have agreed to lend the necessary money provided they are given a charge in priority to the existing debenture stock. Holders of the latter stock are, therefore, asked to assent to the raising of the above-named debenture stock, power for which will be obtained by a further application to Parliament.

Goole Gas Department Losses.—The statement of accounts of the Goole Urban District Council Gas Department, for the past year, submitted last Wednesday, shows a loss of £1576, which, following a loss of £2742 on last year, has practically absorbed the reserve fund. The output of gas was 31 million c.ft., as against 32½ million c.ft. last year. The price of gas, it was stated, has been advanced from 3s. to 3s. 9d. per 1000 c.ft. since September, 1915, and the price of coke from 15s. to 18s. 4d. per ton. The Council referred the accounts to a Sub-Committee, to consider and make recommendations in respect of the remaining period of the present financial year.

Heavy Gas Consumption at Dudley.—Some striking figures were quoted at a meeting of the Dudley Town Council, when Alderman Thompson stated that the Gas Company had been going through a trying time. The increase in the consumption had amounted to 60 p.ct. in 1916, and 80 p.ct. for the current year; and the Company had not been able to instal sufficient plant adequately to deal with it. New plant was being put in; and until this was completed, the Company had entered into an agreement with Tipton and Brierley Hill to supply the town with such quantity of gas as would restore the pressure to its normal state. The Mayor (Mr. Lloyd) said this intimation would be greatly appreciated by users of gas, some of whom had had to resort to candles.

Gainsborough Gas-Workers' Wages.—Trouble which had been for some time pending between the Gainsborough Council and a number of employees engaged at the gas-works culminated recently, upon the suggestion of Sir G. Askwith, Chief Industrial Commissioner, in a reference of matters in dispute to Mr. W. A. Willis, who, as Arbitrator, has now made his award. He has decided that the claim of yardmen, or reserve stokers, to an increase of wages, beyond 13s. 3d. weekly already granted, has not been established, but that a 2s. war bonus granted to the gas stokers should be increased as from Aug. 3 to 5s. weekly. Dissatisfied with the award, the yardmen now threaten further difficulty; several having handed in their notices. The local authority have therefore placed themselves in communication with the Ministry of Labour; it being recognized that the supply of gas must be maintained under any circumstances.



Gas Heated Hot Closet admirably suited for warming workmen's dinners. It is divided into 60 compartments or lockers, each 8 in. × 6 in. × 8 in., with perforated sides, and constructed with steel plates, atmospheric Gas Burners in top, centre and bottom, with separate taps.

Well-fed Workmen are invariably efficient Workmen.

By Appointment. CARRON

The feeding of the workmen, therefore, would seem to practically solve the output problem.

To do this successfully, get into touch with Carron Company to-day and see their profusely illustrated Gas Appliance Catalogue. It will be sent you free.

If in any difficulty, write giving full particulars of your requirements, and receive in return drawing of suggested equipment with full specification—free of cost or obligation.

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are pronounced by the catering world to be unequalled for strength and efficiency, and have been adopted by the leading HOSPITALS, INFIRMARIES, HOTELS, STEAMSHIP LINES, WORKS' KITCHENS and MILITARY CAMPS.

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CARRON COMPANY *Works:* CARRON, STIRLINGSHIRE

Branch Works: Phoenix Foundry, Sheffield.

FOUNDED 1759. INCORPORATED BY ROYAL CHARTER 1773.

Bexhill Water and Gas Company.

It will be reported at the meeting next Tuesday that the accounts for the half year to June show a balance at the credit of the profit and loss account available for dividend of £8295. The Directors recommend that a dividend be declared for the six months at the rate of 6½ p.ct. per annum on the capital authorized by the Acts of 1885 and 1892, at the rate of £4 11s. p.ct. per annum on the capital authorized by the Act of 1896, Order of 1901, and Act of 1904, and at the rate of 5 p.ct. per annum on the preference capital, less income-tax. This, with provision for income-tax, will absorb £4282, leaving £4013 to be carried forward. The business of the Company continues to progress; but the cost of coal and stores has again materially increased. In order to assist in the production of explosives, and in compliance with the wishes of the Government, it has been arranged to instal a plant for the production of benzol. An application was made under the Gas (Standard of Calorific Power) Act, 1916, for an Order to substitute a standard calorific power of 500 B.Th.U. per cubic foot of gas for the standard illuminating power prescribed by the Company's Act of 1885; and the Board of Trade have made the Order.

Hastings and St. Leonards Gas Company.

The Directors reported at the recent meeting of the Company that the accounts for the half year ended June 30 showed a profit balance of £8646, which was insufficient to meet the standing charges and statutory dividend. It was therefore proposed to take the sum of £437 from the balance brought forward. There was an increase in the demand which, coming with a seriously depleted staff, caused a severe strain on the Company's resources. The cost of material and labour at the same time increased to an extent beyond anything that could have been anticipated; and it consequently became necessary to raise the price of gas 2d. per 1000 c.ft. from the Midsummer reading of the meters. The Chairman (Dr. G. G. Gray, J.P.) pointed out that the receipts showed an increase of no less than £10,206; but to secure this they had to expend an increased sum of money of a little more than £1600 in excess of the increased receipts. The receipts would have been even larger had they been able to supply all the apparatus required. At present there were orders for some 150 cookers, which they had not been able to obtain and fix. As compared with pre-war years, the cost of coal had increased 100 p.ct., while the price of gas had only been raised 34½ p.ct. They were paying a heavy amount in war bonuses and allowances to employees whose places were being kept open for them. The report was adopted, the statutory dividends were declared, and cordial acknowledgment was made of the services of Mr. C. F. Botlev (the Engineer and General Manager) and the staff.

Profit-Sharing at Gloucester.—The Committee submitted at the ninth annual meeting in connection with the Gloucester Gas Company's profit-sharing and saving scheme a report for the year ended June 30 which stated that the bonus divisible among the members was £314, or at the rate of 3½ p.ct. for the year. The present number of members is 113.

A Good Balance-Sheet at Woking.—One of the best balance-sheets they had had for a long time was the description given by the Chairman, Mr. C. H. Master, to the accounts [*ante*, p. 391] submitted at the half-yearly meeting of the Woking District Gas Company. A great deal of the prosperity of the Company, he added, was due to their able Manager (Mr. W. H. Ely), who had, with the Board, looked after the shareholders' interests very thoroughly. After payment of the dividends, there would be a sum of £1815 to be carried forward. The gas unaccounted for was 7·45 p.ct. of the make, which compared with 12·14 p.ct. in 1916.

Coal Gas for Motors.—A discussion of considerable technical interest in relation to the substitution of coal gas for petrol for motors took place at a meeting of the Motor Trade Association, which was held at Nottingham last Thursday, and attended by 250 delegates from various parts of the United Kingdom. Mr. A. H. Goodwin, who presided, predicted that a "rough time" was in store for the industry after the war, and urged the necessity of more complete organization. Other speakers foreshadowed that, in view of the probability of the petrol famine becoming more acute, increasing use would have to be made of coal gas; it being claimed that, while much cheaper, it was only slightly less efficient than petrol.

A Special Sub-Committee of the Batley Town Council, considering an application by the Corporation employees for an increased war bonus, have decided to recommend an all-round advance bringing the bonuses up to 10s. per week.

In connection with their motor lorry service, Messrs. Thomas Glover and Co., of Edmonton, are asking gas companies with arrangements for filling-up, within a hundred miles of London, to communicate with them. This is one of the "straws" that point out a direction in which there will be a considerable use of gas in the very near future.

The price of gas is increased at Aberdeen from 2s. 6d. to 2s. 9d. per 1000 c.ft. to domestic consumers, and from 2s. 2d. to 2s. 5d. for gas-engines and industrial purposes. At Motherwell, the price has been raised from 3s. 4d. to 3s. 9d. per 1000 c.ft. Owing to the increased rate of interest on loans, there is an extra expenditure of £3000 a year.

The Gillingham Electricity Committee have decided to adapt the two engines at the electricity works for use with tar oil, at a cost of about £250. It is calculated that, the cost of tar oil being 115s. per ton against the present price of fuel oil of 211s. 3d., the saving to the end of March next would be from £700 to £800, after paying for the cost of the apparatus and installation.

Difficulty is being experienced at Halifax in securing enough lamp-lighters for work during the winter; and the Gas Engineer (Mr. W. B. M'Lusky) says he may have to ask for women for the job. It is proposed to light 1700 lamps, or roughly one-third the full number in the streets. The Gas Committee are appealing to discharged soldiers to take up the work.

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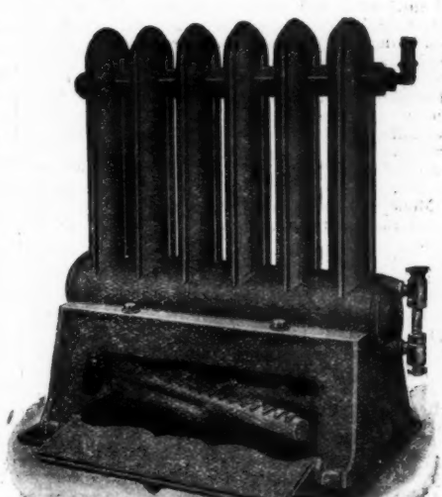
Good Stocks
OF OUR
"RADIO"
GAS HEATED STEAM
RADIATORS.



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Length, 20in. Height, 22½in. Depth, 11in.
Approx. Heating Capacity for Workshops, &c.—
1500 CUBIC FEET OF SPACE.

List Price, **53/6** Each.
Complete with Base Plate.

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Australasian Agents:—
MOLDEN & BUDDEN PTY., LTD., 364a, Little Collins St. Melbourne, Vic., and at Sydney, N.S.W.

STOCK MARKET REPORT.

There was not much change last week in the general outlook of things on the Stock Exchange from the dull tone which had depressed it the week before. But, on the whole, there was some improvement; and the atmosphere became less heavy before the close. Russian affairs were, of course, the mainspring; and, after a gloomy opening, by mid-week the long persistent fall in securities was checked. From this point a recovery set in which affected Russian issues of all descriptions. Other markets did not pick up readily. The question of the next War Loan—its what and its when—continues to enjoy anxious consideration.

The gilt-edged market came out at the end of the week in very fair condition. Home Government issues kept their end up, and the War Loan showed praiseworthy firmness. Indians and Colonials were less so. Home Rails were little noticed until nigh the close. Lines in the Western Hemisphere were dull. Argentines were heavy, borne down by increased expenses, poor traffic, and Government ill-will. The Foreign Market was not particularly strong, apart from the Russian recovery; but Scandinavians and Chinese were in favour. South Africans were irregular.

The Miscellaneous Market could point to some bright spots. Rubber was firm, and Oil recovered much of its lost ground. Explosives and Nitrates continued in brisk demand.

Business in the Gas Market was rather more active, and bargains were pretty well distributed among the list of undertakings. The general tendency indicated by recorded prices was firmness. Changes in quotation owing to *ex div.* variations were numerous; but other changes were confined to Imperial Continental and Primitivas, all of which were in the upward direction.

In the Money Market, there was a steady demand, and rates were quite firm almost up to the close.

Bargains done for cash during the week were as follows: On Monday, Brentford "A" 79½, 80, European 11, Gas Light ordinary 72, 72⅝, 72½, 73, ditto maximum 57, 57½, 57⅝, ditto preference 71½, Imperial Continental 84, 85, Primitiva 41s. 3d. On Tuesday, Brentford "B" 76, 76½, 77, British debenture 69, Gas Light ordinary 71½, 72, 72½, Imperial Continental 84, 84½, Portsea "C" 74, 74½, Primitiva 41s. 3d., 42s. 3d., 42s. 6d., 43s. 1½d., ditto preference 61s. 3d., 63s. 9d., South Metropolitan 72½, 72⅝, 73, South Suburban 75, 75¼. On Wednesday, Gas Light ordinary 71½, 71⅝, 72, 72½, 73, ditto maximum 57, ditto preference 71, 71½, ditto debenture 56, 56¼, 56⅜, Imperial Continental 74½, 75, Primitiva 43s. 9d., South Metropolitan 72½, 72⅝, South Suburban 74⅜, 75½. On Thursday, British debenture 69½, Cape Town preference 6⅞, 7, Gas Light ordinary 71⅝, 72¼, ditto preference 70⅛, Metropolitan of Melbourne 99, 100, South Metropolitan debenture 55⅛, Wimbledon 87, 87⅞. On Friday, British 33⅛, 33⅓, Commercial 4 p.ct. 71, 71⅛, Gas Light ordinary 71⅛, 71⅜, 72, 72⅛, ditto maximum 56⅞, 57⅛, 58, ditto preference 70⅜, Imperial Continental 84, 85⅛, Primitiva 42s. 6d., 43s. 3d., 45s., South African 8⅜, South Metropolitan 72½, 73, 73½, ditto debenture 56⅛, 56½, South Suburban 75⅜. A bargain was marked in Tottenham "B" on Tuesday at 80; the official quotation is 66-71.

The Bank rate is 5 p.ct., as fixed on April 5.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Share.	When ex-Dividend.	Prev. Div. or Div. & Bonus. p.c.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	57—62	..
1,551,868	,,	April 8	2½	5⅛%	Alliance & Dublin Ord.	59—64	60—65	..
374,000	,,	July 10	4	4%	Do. 4 p.c. Deb.	76—79	57—62	..
280,000	5	April 29	7½	4/6	Bombay, Ltd.	5⅞—6⅜	5—5½	..
50,000	10	Feb. 26	16	14%	Bourne-mouth Gas and Water { 10 p.c.	29—30	23—25	..
388,110	10	,,	7	7%	B 7 p.c.	15—15½	10½—11	..
115,000	10	,,	6	6/-	Pref. 6 p.c.	13½—14	9—9½	..
159,740	—	—	—	4%	4 p.c. Deb.	..	69—71	..
992,045	Stk.	Feb. 26	14	5⅛%	Brentford A Consolid.	261—266	79—82	79½—80
734,920	,,	,,	11	4⅛%	Do. B New	204—209	76—79	76—77
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	81—86	..
221,400	,,	June 11	4	4%	Do. 4 p.c. Deb.	91—93	65—67	..
217,380	,,	Feb. 26	11	10%	Brighton & Hove Orig.	203—213	145—150*	..
244,200	,,	,,	8	7%	Do. A Ord. Stk.	154—159	98—103*	..
530,000	20	Mar. 26	12½	22/6	British	44—45	33—34	33⅛—33½
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88—90	68—70	69—69½
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	54—56	..
100,000	10	—	—	—	CapeTown & Dis., Ltd.	1⅛—2⅛	2⅜—3⅛	..
100,000	10	—	—	4½%	Do. 4½ p.c. Pref.	4—6	6¼—7	6⅝—7
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	60—65	..
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	78—79	..
1,513,280	,,	Feb. 12	5/9/4	44/-	Commercial 4 p.c. Stk.	106—108	70—72	71—71⅜
560,000	,,	,,	5½	40/-	Do. 3½ p.c. do.	103—105	64—66	..
475,000	,,	June 11	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	51—53	..
800,000	,,	,,	4	—	Continental Union Ltd.	76—79	39—41	..
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	61—63	..
278,400	—	—	—	11½%	Croydon B and C 7 p.c.	..	165—175	..
—	—	—	—	10%	Do. E	..	..	..
492,270	Stk.	—	6	5⅛%	Derby Con. Stk.	123—125	95—100	..
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	80—83	..
1,002,180	10	July 29	10	5/0	European, Ltd.	17½—18	11—12	11
16,213,430	Stk.	Feb. 10	4/17/4	37/4	Gas Light and Coke { 4 p.c. Ord.	98—102	71—73	71½—73
2,600,000	,,	,,	3½	3½%	3½ p.c. max.	76—79	56—58	56⅝—58
4,002,335	,,	,,	4	4%	4 p.c. Con. Pref.	96—99	70—72	70½—71½
4,074,950	,,	June 11	3	3%	3 p.c. Con. Deb.	72½—74½	55—57	56—56⅝
130,000	,,	,,	10	10%	10 p.c. Bonds	..	..	..
958,740	,,	Mar. 12	5	3½%	Hastings & St. L. 3½ p.c.	87—89	46—53*	..
70,000	10	April 29	11	6%	Hongkong & China, Ltd.	16½—16⅞	7½—8½	..
86,600	—	—	—	9%	Hornsey 7 p.c.	..	115—125*	..
131,000	Stk.	Mar. 12	7½	7%	Ilford A and C.	151—154	92—97*	..
65,780	,,	,,	6⅝	5⅝%	Do. B	115—118	72—77*	..
65,500	,,	June 26	4	4%	Do. 4 p.c. Deb.	92—94	65—68	..
4,940,000	,,	May 14	9	4½%	Imperial Continental	150—160	83—88	84—85
1,285,000	,,	Feb. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	62—65	..
235,242	,,	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	82—87*	..
2,498,905	,,	Feb. 26	10	5%	Liverpool 5 p.c. Ord. { A / B	211—213 / 146—148	81—82	..
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	70—72	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4⅛—4⅜	3⅞—4	..
250,000	100	April 1	4½	4½%	Met. of Melbourne { 4½ p.c. Deb.	99—101	88—98	99—100
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11⅛—12	8—8½	..
1,875,892	Stk.	July 29	4½	4½%	Newcastle&Gatsh'dCon.	98⅝—99½	70—71	..
529,705	,,	June 26	3½	3½%	Do. 3½ p.c. Deb.	82—83	61—63	..
55,940	10	Feb. 26	7/14/0	7%	North Middlesex 7 p.c.	14—15	9½—10½*	..
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	104—106	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7⅛—7⅜	2—3	..
60,000	50	Feb. 26	13	12%	Portsea, Island B	128—131	83—88	..
100,000	50	,,	12	11%	Do. C	118—121	73—78	74—74½
52,000	50	,,	10	9%	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5⅛—6	2 5/16—2 5/16	41/3—45/-
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref.	4⅜—5	3 5/16—3 5/16	61/3—63/9
521,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91—93	78—80	..
—	—	—	—	4%	Do. ,, ,, 1911	..	..	..
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85—87	59—64	..
150,000	10	May 14	6	6/-	San Paulo { 6 p.c. Pref.	10½—11	7⅜—8⅛	..
195,000	50	July 1	5	5%	5 p.c. Deb.	47—49	40—42	..
135,000	Stk.	Mar. 12	10	10%	Sheffield A	223—224	..	..
209,984	,,	,,	10	10%	Do. B	232—234	180—184	..
523,500	,,	,,	10	10%	Do. C	220—222	..	..
90,000	10	May 28	9	6/-	South African	10½—11½	8½—9½	8⅜
6,609,895	Stk.	Feb. 10	5/4/0	46/8	South Met. 4 p.c. Ord.	111—113	72—74	72½—73½
—	—	—	—	—	Do. Pref.	—	—	..
1,895,445	,,	July 10	3	3%	Do. 3 p.c. Deb.	72¾—74½	55—57	55½—56⅛
224,820	,,	Feb. 26	8½	7⅛%	South Shields Con. Stk.	157—159	137—139	..
952,795	,,	,,	6	4⅞%	S'th Suburb'n Ord. 5 p.c.	114—116	74—76	74⅜—75½
60,000	,,	,,	5	5%	Do. 5 p.c. Pref.	110—112	75—77	..
135,000	—	—	—	4⅝%	Do. West Kent	..	..	..
187,553	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	86—88	..
647,740	,,	May 14	5	5%	Southampton Ord.	99—102	76—78	..
120,000	,,	Feb. 12	7½	5⅞%	Tottenham District { A 5 p.c.	135—138	92—97	..
782,275	,,	,,	6	4%	B 3½ p.c.	115—117	66—71	80
181,255	,,	June 26	4	4%	4 p.c. Deb.	87—89	63—65	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	60—65	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max.	103½—100½	89—91	..
30,000	,,	Feb. 26	8⅜	7⅜%	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	151—156	112—117	..
255,636	,,	,,	6¼	5⅞%	Do. B 3½ p.c.	129—134	97—99	..
108,075	,,	,,	5/17/8	50/9	Do. C 3½ p.c.	110—115	84—89	..
353,000	,,	,,	6¼	5⅛%	Wimbledon 5 p.c.	117—122	85—90	87—87½
98,000	,,	,,	6⅜	5⅞%	Epsom 5 p.c.	121—126	93—98	..
88,416	,,	June 26	3	3%	3 p.c. Deb. Stk.	66—69	50—53	..

* Ex. Div.

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GAS JOURNAL

LIGHT ✂ HEAT ✂ POWER ✂ BYE-PRODUCTS

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VOL. CXXXIX., No. 2837.] TUESDAY, SEPTEMBER 25, 1917. [69TH YEAR.

EDITORIAL NOTES.

Fuel Oil and Reduced Carbonization Temperatures.

NOT long since we ventured to state that it was probable nothing more would be heard by the gas industry about carbonization at reduced temperatures, with the view of securing a larger amount of fuel oils for Government purposes. That this was a fair assumption in view of ascertained facts—facts which proved the heavy losses sustained by reduced temperature operation compared with the gain in creosote and green oils per ton of coal carbonized—is borne out by the communication we publish to-day [p. 552] from the Ministry of Munitions, with explanatory notes by the National Gas Council. We are glad to see that the Ministry of Munitions take upon themselves full responsibility for the hurried general appeal that was made to the industry. "Owing to the urgency of the situation," the Ministry write, "we were unwilling to face a postponement "of a general appeal to the industry until this information "[the cost of production of fuel oil by abnormal methods "of carbonization] was forthcoming." Granted that the situation was urgent, the issue declares that it would have been better to have first ascertained the necessary data experimentally than to have precipitated the whole gas industry into a state of uncertainty and many works into expense; for no good whatever has been effected beyond a universal proof of an inappreciation of facts that might have been gained much less expensively and more promptly—facts showing that, while the fuel oils might be increased by as much as 50 p.ct. per ton of coal carbonized, the carbonizing capacity of gas-works would have been reduced to such an extent that, in the final result, the 50 p.ct. would have largely, if not entirely, disappeared, the gas industry would not have been able to comply with its obligations, and the cost of any increase of fuel oils (if any) would have been altogether beyond sane contemplation. We do not, however, anticipate that the industry will now feel particularly aggrieved over the matter. A mistake was, unfortunately, made, for which the National Gas Council are certainly not to blame, as some critics have imagined; and no use is to be served by labouring it. The Ministry appreciate greatly the efforts that have been made by the industry, and naturally regret the result. The industry, on its part, will be glad to hear that there has been an unexpected improvement in the oil situation. It will also note that the Ministry are still desirous of entering into "arrangements "with individual undertakings which, by variations of their "present methods, are able to increase their output of fuel "oil at a cost which, though higher than the present cost, "can still provide it *at a price that can compare with that of "other sources of supply*." This does not give much scope, and therefore not much promise.

The Sliding-Scale and Disappearing Dividends.

IT has been said that in a multitude of counsellors there is wisdom. In respect of the subject of the sliding-scale, an eminent gas engineer recently hinted that, in the multitude of counsellors, there is bewilderment. Nevertheless, further suggestions were sought; and from the suggestions something may emerge that is better than anything else that has preceded. But it must be borne in mind that "Time flies." Procrastination may suit the book of some, but not of all, for every week that passes with the heavy cloud of injustice overhanging gas capital means the greater probability of the condition continuing some time ahead. In an article by Mr. Arthur Valon, which we publish this week, on the "Sliding-Scale and Disappearing Dividends," he discusses several pertinent matters bearing upon the position. There may not be agreement with all his points; but, in the main, his reasoned contentions are unanswerable. He suggests that the reluctance shown by the "chairmen "of the larger companies to make a definite effort to obtain "a revision of the sliding-scale arises, no doubt, from a "patriotic preference." That is a kindly inference. We do not, however, think the patriotic aspect has had much to do with the matter, but other considerations have had an influential weight, though the present, in view of a more hopeful prosecution of the just claims of the industry, is an inopportune time for discussing them. However, an examination of the facts of the current position points to the impossibility of any valid claim to "patriotic preference" being made in respect of a condition of things that allows the purchaser of a commodity to pay a price that will not give the investor of capital—the capital necessary to enable the commodity to be produced—a fair return for his money. Justice has an equal claim to patriotism.

Mr. Valon describes the theoretical principles on which standard prices are fixed, and refers to the net price of coal, cost of labour, and cost of capital as the base factors of the sliding-scale. He also submits that, for the purpose of a standard price, these factors are looked upon as fixed, except for small market fluctuations. From a study of existing standard prices we are not at all satisfied that promoters and opponents of Gas Bills in which the sliding-scale is being introduced do not differ as to the principles on which standard prices should be established—anyway, the divergent views as to the amount of standard prices are proof, positive that the principles are not being religiously observed. And as to the "base factors!" A study of the history of this matter shows that, without the flow of time, the fresh standard prices have been falling as the net cost of coal, the cost of labour, and the cost of capital per cent. of stock have been ascending; so that there is a misapplication somewhere of both principles and factors. Nevertheless, while all the "base factors" have been mounting up, the price of gas has been (this, of course, prior to the war) sliding down. So credit has to be bestowed elsewhere; for the assistance of coal, labour, and the higher cost of capital per cent. in producing a lowering of the price of gas, has been of a negative character. All the progress that has been made in the lowering of prices to consumers has been due to improvements in process and method and to care in management. Therefore, the conditions of to-day would have been much worse had it not been for these circumstances; and for all that has been accomplished, in the face of the upward movement of the "base factors," there is not in many companies in these war days a particle of reward left. We are with Mr. Valon in all he says as to the injustice of this.

But our contributor then gets on to more controversial ground; and what he says should be taken into account in the consideration of the question as to the extent of the alteration that should be asked for. In this matter, our view-point has been that we should never overlook the principle of the sliding-scale, that exacts a sharing of prosperity as well as of adversity in normal times between stockholders and consumers. We have now come to a position where terms framed for normal times have produced, under abnormal circumstances, a condition that is causing, and has in cases caused, capital to have but the shadow of a fair return left. And we feel a little uneasy as to what is going to happen as the result of the present negotiations between the miners and the Coal Controller in regard to a further percentage rise in wages. We must take possibili-

ties into account in considering what should be sought in making a revision of the standard price. Mr. Valon has little sympathy with those who suggest that it would be impolitic to demand the alteration of the standard price to an extent that would permit of the payment of the pre-war rate of dividend. Even if allowed to pay the pre-war rate, this would only be at the pre-war market value of money, and not at the war nor the *post*-war value. Added to this, it must not be forgotten that many shareholders—a great majority, in fact—paid premiums for their gas stocks; so that the nominal pre-war dividend is not the actual return on the money paid by them per £100 of stock held. These are important considerations; and, taking them all into account, our contributor is not of opinion that merely being allowed to pay up to the full standard dividend would meet the requirements of elementary justice. We quite agree, looking at the amount of the standard dividends of some companies, and the size of the war income-tax. Though, in such a state as that of current affairs, sentiment should not be allowed to enter into the question (but the treatment of it should be on the grounds of justice and the preservation of the financial stability of the gas industry), there should be discretion. Therefore, Mr. Valon suggests that probably substantial justice would be done if the standard price were increased in proportion to the net cost of coal—say, as a temporary measure for five years. We cannot, of course, hope to get to any mathematically exact accuracy of treatment for all the varied conditions of companies; but even Mr. Valon's suggestion would not meet all cases, where there have been extraordinarily heavy commitments in regard to labour, ship insurances, and other things, which have had remarkable effects. It is a complicated business; but Mr. Valon's suggestion, like others that have been made, would give a measure of relief. Some relief must be obtained. Just as the German reinforced concrete works at the front are being battered down by our guns, so the financial reputation of the gas industry is being seriously battered by the force of present conditions. Recovery will be a long job, unless the industry can show it has men who can handle such a serious emergency as the present one. For the reason that we are more hopeful to-day than before, we will not discuss the last paragraph of our correspondent's article.

A Contrast.

THE gas industry at home has war difficulties of, to it, unprecedented intensity and obduracy; but it has something for which to be thankful in that they are not equal in either respect to those existing on the Continent—especially in the countries at war with us. We have made no secret of the troubles with which the British gas industry has had and still has to contend. Through our columns, they are as well known to members of the German gas profession who are able to secure copies of the "JOURNAL" through neutral countries as are those of Germany to the British gas profession through the information gleaned by us from German papers. We have lately published a mass of interesting matter referring to the straits in which the German gas industry finds itself. These straits have much the same origin as have the difficulties here; but their effects, through various causes, are more onerous—partly owing to the more exacting decrees of official despots, whose exercise of powers and manner of dealing with the conveniences of the community are exactly consonant with what one would expect from the training and example of martinets. Reading what has happened in Germany, including the graphic description of the occurrences by Herr Hase, of Lubeck, in his Presidential Address to the German Association of Gas and Water Engineers (as recently published in the "JOURNAL"), his ameliorating statement that "the ill-effects of the war on the "gas industry have been more marked abroad, especially "in the countries at war with Germany, than at home," is particularly hollow, and at variance with his stated facts, preceding and succeeding.

The statement may apply to our Allies—France, Italy, and Russia—in varying degree; but, in contrast with Great Britain, Germany's gas difficulties are supremely heavy. "Our chief enemy," so Herr Hase has the courtesy to call Great Britain and Ireland, has suffered privations in its gas industry—shortage of material, high prices, and serious wages struggles. It would do our German critic's eyesight a vast amount of good to see the coal stock preparations on many of our gas-works for the coming winter's operations; and at no time has there been the really serious trouble, and the like inattention on the part of the authorities to the requirements of the gas undertakings in this country that are depicted in the German Presidential Address, the report of the Council of the Association, and other sources of information. We do not deny difficulties with supply; but we do deny that they have been in any way on the same plane as those of German undertakings. The prices for coal, too, have been high; but the height has more to do with location and consequent carriage than to anything else. Herr Hase conveniently overlooked the fact that the Price of Coal Limitation Act gives the colliery proprietors 4s. more per ton than the contract prices arranged in 1913-14, and that it is the seaborne coal, through the rates of freight, that costs such high figures when delivered in the South of England. We have no coal-tax here the same as is the case in Germany; none of our gas-works have had to close-down through shortness of coal supply; there have been no restrictions placed upon the consumption of gas; and in London we have no such charges as are about to be made in Berlin—charges equal to 4s. 6d. to 5s. 8d. per 1000 c.ft., and to the small consumers 5s. 1d. Then in reference to wages difficulties, they have been chiefly in the North, among the municipal undertakings; but arbitration has composed them. We do not deny that there have been and are difficulties; and we have never minimized them. But we do assert that, out of the mouths of the bitterly complaining gas engineers of Germany, together with the published facts, there is plenty of witness to the difficulties of German gas undertakings being immeasurably greater than our own, despite the allegation of Herr Hase through ill-information.

At the same time, there are features in common in the difficulties of British and German gas undertakings. Transport troubles are great. The ash content of the coal is such that less gas and secondary products are yielded per ton, and the coke is not of such acceptable quality as would be preferred. The extraordinary ash content increases labour, and diminishes carbonizing capacity and efficiency. This is all a reflection of the conditions in this country. But there has been a burst of indignation in Germany against the official ordinance that consumers must diminish their use of gas by 20 p.ct. compared with last year, accompanied for any default in the way of excess by a first charge of 14s. 2d. per 1000 c.ft.; and for a second contravention of this and several other stipulations, there will be a fine not exceeding £500. The German gas engineers are filled with disappointment and bitterness against this. If only the coal were supplied, they could meet all demands. They see reasons why coal supplied to them instead of to other people would effect an all-round economy. They are much incensed at the ignorance of official controlling authority, which does not know or appreciate that, with the small thermal efficiency of the household stove, a transfer of coal from it to the gas-works would result in a thermal economy through the provision of gas and coke, and hence a saving in the carriage of coal. They are annoyed at the fact that the compulsory reduction of gas consumption applies to heating as well as to lighting; and so are the public and the public press. Next winter is not being approached with any feelings of confidence and pleasure by the public, who, now that there is restriction in the use of gas, appreciate more than they ever did before what a valuable, friendly, and convenient agent it is to them. They would suffer reduction of lighting with equanimity, but to take away gas for cooking and heating is as great a deprivation as restriction would be in the supply of lager beer. All the arguments gas engineers can bring to bear on the position have been brought. Herr Korting thinks the supply of coal of which gas-works are deficient could be drawn from the coke-ovens. Other men point to the economical handling of coal by the mechanical plant of gas-works compared with its house-to-house distribution for grate use, and to the ease of gas distribution by pipes, which saves labour, as well as helps to preserve the road surfaces. But German officialism is relentless; its determinations require a more stringent solvent than practical argument. New gas connections are also prohibited, except in certain instances, unless consent can be secured. The German gas industry is under a baneful subjection, unequalled (albeit that Herr Hase says otherwise) by the regulation of the gas industry in any other country now at war, and least of all by that of the gas undertakings of the so-described "chief "enemy." In one thing we are firmly in agreement with Herr Hase—in his expression of confidence in the future of the gas industry after the war. The foundations have not

been in the least injured by the international eruption; as a matter of fact, they have been strengthened by the war. What is wrong at the present time is that the industry is working under fictitious conditions; and until they are removed there can be no certain registration of actual progress. But greater progress and greater usefulness will come to the gas industry as sure as day follows the night.

And the night is one that has been made blacker by the dastardly initiation and deeds of the Germans, which Herr Hase applauds, and in which initiation and deeds he has a profound and tranquil faith born of false report. He believes that the German submarines and aircraft—roaming hidden under the water or flying thousands of feet in the air—with their records of murder and maiming of civilians, including women and children, and the destruction of homes, will attain the object and produce what he, in his innocence of the villainy of Prussian Militarism, chooses to describe as a "just retribution." That is war as made in Germany; and there are Germans who are proud of it! We cannot, however, believe that human feeling is so dead among all Germans that, knowing the truth of the foulness of which Prussianism is guilty—foulness embracing the sinking of hospital ships, and now the bombing of hospitals in which helpless men are lying—they would defend such vile actions as Herr Hase has—we hope unwittingly—done. He may continue to rail at the "JOURNAL" to his heart's content. We care not. The "JOURNAL" represents an industry with men at the war, and with men on unarmed ships that have been torpedoed by German war vessels, and an industry supplying homes that have suffered heavily from the merciless bombs of German scattering. Herr Hase may glory in all this. Germany's barbaric deeds have made not Herr Hase, but the civilized nations of the world stand aghast, and have aroused them to the work of compelling the observance of laws of human and higher creation. When Germans again emerge into the outer world, and come once more upon the tide of human affairs, they will find the scorn of the world and the brand of a deep degradation upon them. The outer world is in a position to judge; the misinformed German nation is not. When it is—when the history of this war with all its detail of horror of Prussian genesis is told—if hatred does not blind the eyes and subvert reason, many there will be in Germany who will wish they could turn and rend those who have been the means of dragging down the name and the reputation of their Fatherland into such a depth of the filthiest of mire. Judgment upon these matters fortunately does not to-day rest in Germany alone. This should be remembered when the President of the German Association is tempted to denounce the considered judgment not of a single observer and writer, but of vast countries and millions of people of freedom, of ripe intelligence, and withal possessed of the truth.

"The Time has Fully Come."

FOR a long time past, as Mr. J. Mogford, of Briton Ferry, acknowledges in the Presidential Address that he delivered last week to the Welsh Institution of Gas Engineers and Managers, we have emphasized the importance of the gas industry making a real organized move to shape the course of its practices and work generally to the demands of the times, and to meet with a bold front the plans of the competitors, which are right and proper in their own interests and in endeavouring to better serve the national economy. Complacency with development without any special effort is an evil appertaining to the gas industry which must be combated. There are, as we have pointed out before, committees at work, and schemes maturing, within the electricity supply industry, each and all having for their object an enhanced economy and efficiency; and every additional success to this end means a lower price and so increased ability in competition. We are by no means alarmists; but let the men responsible for the industry's development and advance have their eyes wide open to the facts that are before us, and not allow the great advantages the industry possesses to lie dormant, and no endeavour be made to reap from them the highest possible profit. It is very difficult to say precisely to what are due the complacency and want of visible energy in the gas supply industry in this matter of organized effort and deliberate aim, apart from individual action. Is it owing to something of a traditional nature that has come down to these times from days when the gas industry had practically no competitor? Is it due to the fact that the gas industry has largely relied for meeting competition on adventitious circumstances coming to its aid just when most needed—such as the invention of the incandescent mantle? Is it owing to the gas supply industry leaving the means of its advance so largely, and with such complete confidence, to the manufacturers of gas lighting, heating, and power appliances? Is it due to the fact that it is felt there is an unassailable security in the gas industry's operations being established on the utilization of coal in the best of current utilitarian modes? If not to any of these things, then to what are the complacency and want of internal organized effort due? The attitude, any way, has lost (if it ever had any) all strength and reason. The circumstances developing about the industry include the fact that the competitors are organizing, investigating, and planning. What they are doing will be brought against the gas industry with all its force; and we shall find our weaknesses exposed to the attack, and all owing to an indifference to what is happening at our very doors.

The position has not escaped Mr. Mogford. We wish its significance had not escaped many other men in the gas industry. Then, although better far would have been an earlier organized movement, they would have arrived at the conclusion that "the time has fully come when the "supply of light, heat, and power to an industrial district "[we submit to all districts] should, in the interest of the "trade of the nation, be obtained by the destructive distilla-"tion of coal, the recovery of its valuable bye-products, "the complete gasification of such of the residue as is not "required for metallurgical purposes, the distribution of "gas of such composition as investigation shall prove to be "most suitable for general purposes, and the distribution "of electricity generated by means of internal combustion "engines." That, in effect, is just what we have long been preaching. We know there have been from some quarters suggestions of an undue view of the position. Very well. Let us reply by asking, and so pointing a moral, what has made the present war so long? There is only one answer: The unpreparedness for war of the Allies against the preparedness of Germany. How was it Germany overran, at the beginning of the war, such large tracts of the territory of the weaker nations? Why is it we have now the work before us of forcing Germany back over that territory yard by yard? The same unpreparedness. The gas industry must organize and plan to meet the new circumstances with which it will have to contend. It has no definite policy; no plan of campaign; and is there any evidence it is anybody's business to go seriously into the matter? The Gas Components Committee of the Institution of Gas Engineers and the Leeds University are at work, or preparing for work. But what else is being done? The industry is leaning heavily and hopefully upon the Board of Fuel Research. Self-help is a more worthy condition. Reliance upon others may lead to disappointment, and disadvantage where advantage was expected.

We leave Mr. Mogford's address to speak further for itself on these matters. It is worth reading. It is a statement by one who has thought; by one who sees danger ahead with inaction continuing on our side; by one who sees possibilities everywhere, with his eyes on a concrete scheme for Wales in the shape of linking-up, consolidation, and a widespread service; and by one who does not appreciate the gas industry being oppressed as it is to-day to an extent that its capital is not earning, and is certainly not receiving, anything approaching a fair average return—partly through the injustice of government controlled prices, and partly through the normal working of the sliding-scale in abnormal circumstances and under abnormal conditions. Yet, we read "an industry whose operations are essential "for the defence of the realm, and whose products are "equally as important in times of peace, must of necessity "be a valuable national asset." The "valuable national "asset" is not allowed its just reward; its administrators are leaving it much to others to shape its future course; and the while we talk finely regarding its large opportunities. "The time has fully come" when a vigorous organized movement should be made the same as in other industries for purposes of defence and progress.

We are glad to see that the Welsh Institution have had under consideration the question of founding co-operative tar distilleries; also the suggestion of the President in respect of a similar arrangement being applied to the utilization of ammoniacal liquor. The smaller works have too long been the victims of a condition of things in regard

to their secondary liquid products which should be terminated. There are, of course, difficulties in co-operative tar distilling, or the working-up of ammoniacal liquor; but to business men these difficulties should not be beyond negotiation. The best plan, of course, would be co-operative distillation through a neighbouring large gas-works; but failing that joint enterprise. If tar distillation is a paying business for the distiller outside the gas-making industry, it should be likewise for a large gas-works and its immediate smaller neighbours. There are economies in transport all to the good of co-operative working, and a power of control that under current circumstances is simply handed over to those who do not produce tar, but who advantage themselves considerably at the expense of those who do. Mr. Mogford would like to see a simple means for the direct manufacture of sulphate of ammonia which could be adopted without purifier troubles. The recent discussion of this question by Mr. W. S. Curphey, the Chief Inspector under the Alkali Works Regulation Act, leads us to hope that the difficulties are amenable to control, though there is not satisfaction yet that the direct system under gas-works conditions can be raised to the make per ton efficiency of the old system, though this is in some works deprived of much credit by the lack of supervision. However, these matters of detail in general operations all point to the one fact, that there is infinite work to be done in advancing the interests of the gas industry.

The Showroom and Economical Appliances.

ALTHOUGH some gas undertakings are at their wits' end as to how to keep pace with orders for new connections through present well-known causes, and the managements of some others are declining to jeopardize the supply to existing consumers by fixing additional apparatus, at the same time there is wisdom in the effort to keep the public well informed as to what can be done when opportunity again offers. No more than can be helped, people must not be allowed to think that the war has put the gas industry into a somnolent condition. One means of demonstrating that vigour is as great as ever, and that it is only war-produced lack of means that limits the exercise of energy, is by maintaining the showroom at the highest possible degree of efficiency. Therefore even though war time has imposed restrictions on business, the brief survey of what a showroom should be like that Mr. W. H. Cattell, the Chief Salesman of the Swansea Gas Company, made at the Welsh Institution meeting last week, is not at all inopportune. We have only to ask ourselves what are the objects of a showroom; and, if there is no lack of imagination, the answer will be the first stage in the constructive piece of work that shall serve these objects. The drab shoplike character of the old-time showroom where it still exists, it must be confessed, is an excellent testimonial to managerial unprogressiveness. The showroom of to-day should be a place of silent temptation, by the object-lessons it conveys, and which object-lessons should be varied from time to time—at any rate, in the windows. Mr. Cattell modestly tenders a number of sound principles as to what should be the mission of the showroom, and advice as to how to carry them out. Smart window dressing, with changes at fairly frequent periods, and means for demonstrating appearance and use, are requisite. Everything should show how far practices are to-day from the crude usages of the past, and how gas means progress in our everyday affairs. People, too, should be made to see the over-all economy arising from the use of gas. It must be remembered that there are other methods of lighting, heating, cooking, and power, which to the eye are equally attractive; but the public do not always understand that between attractive objects the relative economy may be as wide asunder as the poles.

In considering the showroom, there is another matter that should not be overlooked. It is that all people's pockets are not lined alike; so that, while highly finished appliances in richly appointed settings are on view, the householder of moderate means must see that his needs can be catered for equally well. The counsel Mr. Cattell gives as to letting householders know to the last penny what a job will cost them, so that their full obligation is discharged within that price, is a good one, as is also the advice that every gas undertaking should on its own account put to test the gas appliances offered to them so that they may recommend with a clear conscience. At Swansea, testing is carried out in order to give would-be users exact information, and to guard the Company's own interests. If people, for instance, consult the Swansea Gas Company's officials, they will not adopt the "Multi-" Cooker," which was at one time much advertised, then there was a quieting-down for a time, with latterly a fresh outburst on a more modest scale. In the new advertisements, so far as we have seen them, mention of a fanciful percentage saving of gas has been dropped. The challenge of the British Commercial Gas Association to substantiate the figure, has probably made the "Multi-Cooker" people rather more discreet. The tests that have been made at Swansea show that, instead of a percentage saving, there are good percentage losses in both gas and time, and the mode of "saving" necessitates a higher pressure of gas, or probably the work would require still more time to accomplish. The manufacturers of ordinary gas-cookers will notice that still higher efficiency is looked for at Swansea, which means that what the manufacturers have already done towards the improvement of cookers is not regarded as the ultimate possible efficiency. We should like to see the manufacturers all working hard to improve both the efficiency of the oven and the hot-plate. Whether external heating or internal heating of the oven is coming out top in this matter, time and development alone must show. But the more efficient hot-plate is badly wanted for the domestic cooker; for, though B.Th.U. may be cheap with gas, prodigal use discounts the cheapness.

The Activities of the National Gas Council.

After the editorials were in type this week treating of the need for immediate co-operative action for the advancement of the gas industry, and commenting upon the question of the sliding-scale, we incidentally learned that the Utilization of Fuel Resources Committee of the National Gas Council have lately held quite a number of meetings, and will be reporting presently. To a certain extent, this has a bearing on the various plans for the future of the electricity supply industry—the linking-up schemes, and those proposing the centralization of electricity generating plants, with coal carbonizing and bye-product recovery as the initial process in the work of generation. Economy, together with the questions of coal conservation and the volume of output of bye-products, should forbid that course. The proper place for the carbonization of coal is at those works that are so circumstanced that they can best utilize the products derived from coal carbonization, and these works are, without doubt, those that already have direct dealings with the public—domestic and industrial, in the matter of gas supply and the provision of other products for industrial operations. If consolidation is economically correct in respect of electricity generation, it is the same, within certain territorial boundaries, for coal carbonization; and no argument is required to support the proposition that, given a larger sphere of action in the matter of coal carbonization, the gas industry will be able to serve the community with gas and the industries of the country with its products generally on more economical terms than is possible under its present local restrictions. The Utilization of Fuel Resources Committee are, we understand, hard at work in this direction. As to the sliding-scale, the Council have a strong Committee going into the matter. They have lately met, and considered a large amount of information that has been collected, sifted, and co-ordinated. The whole subject will be discussed very shortly. It is to be hoped the question will be pushed forward with the utmost speed. There is pressing need for action for the reasons already advanced in several articles that have appeared in our columns.

A Benzol Producers' Committee.

From time to time in papers and articles that have been published, suggestions have been made that a Benzol Association should be formed for the purpose of protecting producers after the war, and assisting in opening-up, in a proper way, the channels of permanent business after the requirements for war purposes have been finally satisfied. A strong Committee of producers has been formed for guarding the future interests of the business. The Committee embodies representatives of gas undertakings, coke-oven owners, and tar distillers. Various schemes were suggested at a meeting held in connection with this movement at the Gas Light and Coke Company's offices; and the Committee will be almost immediately getting to work to consider the various

proposals. They are not taking action any too soon. The colossal oil companies have their eyes on the situation as it affects them. They do not want anything to happen that will in any way assail their control of the motor spirit market; and at intervals there have been indications that they were considering how best they could secure control of this competitor which is going to influence the petrol position in the motor world. As a matter of fact, there will be room for all; and one of the most important questions for the Benzol Committee to decide will be whether they should ally themselves with one or other of the great petrol companies or keep themselves entirely clear of any linking-up scheme. At any rate, the motor-car and dye industries, as well as users, will be (or should be) profoundly obliged to the benzol producers if they maintain an independence of the huge oil interests.

The Coal Factors' Portion.

In the issue of the "JOURNAL" for Sept. 11, we reproduced the order of the Coal Controller regarding the scale of charges per ton in excess of pit-head prices that coal factors and merchants may charge to certain purchasers. The scale is giving greater dissatisfaction to those placed under the higher charges; and in the gas industry the question is being asked why, if 3d. per ton is a correct excess charge for coal supplied through coal factors to railway companies, three times that sum should be considered to be a correct one for the gas industry. And further it is asked why munition works, at which large profits are being made, should only have, as payment to the coal factors, 6d. per ton put upon them, while gas-works, which are also essential munition works in a very considerable way, should have to pay 9d. per ton. We can understand that gas companies can offer facilities for the transit of coal, but do not see that their conditions as consumers or anything else will justify such a large percentage difference between them and other works; nor, in view of what the gas industry is doing for the country, with controlled prices for several of its products, is there any sound reason for the disparity between it and other munition works. We shall not be surprised to hear that representations regarding the matter will be made to the Coal Controller.

A Federation of Gas Engineers.

A suggestion is made by a correspondent [see p. 555] that the position of affairs in the gas industry would be greatly aided by a Federation of Gas Engineers, to be operated under a Board elected annually. The suggestion, we are afraid, has come too late, as a very general opinion in the gas industry is that any development in organization now must include all interests—financial, engineering, chemical, and commercial; and the National Gas Council is the organization *pro tem.* through which and by which, it is hoped, the fuller representative body will be brought into being. On the National Gas Council, the Institution of Gas Engineers have a good representation; and some of the very work that it is proposed by our correspondent should be done by the Federation is now in the hands of the National Gas Council and the Commercial Sections of the District Gas Associations. We are confident that Government Departments who at one time became sickened of the number of organizations in the gas industry that approached them, and which number always placed them in a quandary as to which one they ought to consult, would—now that they do all their discussion and consultation through the National Gas Council—be prepared, with memories of the past still vivid, to give the cold shoulder to a Federation of Gas Engineers. It must not be forgotten, too, that the National Gas Council includes gas administrators; and we are more than a little bit doubtful as to the reception that would be given by them to a proposal by their own engineers to form a body among themselves to usurp the powers of the National Council. Matters have advanced too far for such a recession in the industry's policy.

Man Power Reorganization.

The other day Sir Auckland C. Geddes, the new Minister of National Service, outlined to a deputation his scheme for the reorganization of the work of the department. He has not sufficiently far advanced to give any more than a vague idea of the details of the new scheme; but he said enough to show that the intangible policy of the past, which, instead of organizing national service, has brought it to a condition of chaos, is to be placed on a well-considered, and what we hope and believe will prove to be a more effective, basis. It should be said that the fact that the late Minister did not succeed was not due to personal shortcomings, but to the impossible restrictions under which he had to work. The gas industry, among others, has felt acutely the muddled influences that have been operating; and no industry will be more thankful than it to have its man power, other than the part which comes under protection through the Ministry of Munitions, put on a proper footing. Of course, at the beginning of the war, the calling-up of men for service in the field was an urgent matter, and had to be done hurriedly, with the result that the most active and energetic men were first drawn from industry generally. But the strange thing happened. The years have passed without any efficient systematic plan being devised for dealing with this important question, with an eye to maintaining a good balance between the requirements of the army and navy and those of the industries and trading of the country. Sir Auckland Geddes realizes the complicated task that he has taken in hand; but he hopes that the reformed department, of which he is the head, will be able, without attempting to work miracles, to get the problem of man power under fair solution, and to wipe out abuses.

The Scheme in Broad Outline.

Sir Auckland is departmentalizing the Ministry, each department having its own particular sphere of work. Information is going to be collected from every available source and studied; but absolutely nothing can be done before the confusion is intelligently straightened out, and a clear view is obtained of the labour needs of the country. Exact information is going to be collected as to the immediate and prospective demands for men in the country to carry out the programme of the Government war departments. The Committee which will have this work in hand will have the powers of a National Priority Committee; but—this our readers will be interested in learning—the Committee will not interfere within the sphere of the Ministry of Munitions. At the same time, the orders resulting from the work of the Priority Committee of the Ministry of Munitions will go out from the Ministry of National Service. Sir Auckland has come to a very definite conclusion—that it is impossible to clear all the younger men out of the industries, and leave only the older men in them. He believes that, for work behind the lines, men of 40 years and upwards could take the place of younger men. The former, in his opinion, would have a steadying influence upon the latter. In the works at home, too, he thinks, very real difficulties would arise if they withdrew all the young men, or too many of the older men. It is essential, and this is at the base of his policy, that there should be a fair proportion of middle age and youth left to do the work of the country, and a healthy balance must be created. There will be good confidence in leaving matters to one who holds such enlightened and practical views as those to which Sir A. Geddes has given voice. The country has got more than tired of the everlasting uncertainty of indecision and inexact rule.

The Needs of Gas Lighting.

An address reawakening thoughts on the subject of gas lighting is that which Mr. W. J. Serrill has made, as President, to the members of the Illuminating Engineering Society of America. It is now some few years ago that Mr. Charles Carpenter, D.Sc., was reminding his colleagues that gas lighting continued to be the backbone of the gas industry's business, and that uniformity of gas composition, freed from deleterious constituents, and consistency of pressure were all-important in the defence of this part of their trading. In respect of lighting, more than in any other branch of the industry's business, we are on the defensive; and we must not forget this. But with the abandonment of the illuminating standard and the enthronement of the calorific one, there should not be the same difficulty now in maintaining uniformity of composition, which is a great gain. The use of a mixture of coal gas and water gas imposes an obligation in respect of supervision which again presents no insuperable difficulty, providing a proportion of coal and water gas plant is provided that will enable a constant mixture of coal and water gas to be distributed despite seasonal variations. When Mr. Serrill speaks of water gas, he has, of course, in mind carburetted water gas; and the oil is an additional factor demanding oversight to maintain uniform conditions. With blue water gas (properly made), a gas is given that, providing the correct proportions are maintained, rather

contributes to, than detracts from, flame temperature, which is the condition for incandescent gas lighting. There is, too, a smaller amount of condensable hydrocarbons in the gas, which all contributes to the maintenance of uniform constitution. It is well to be reminded by such addresses as that of Mr. Serrill of the correct lines of duty in the matter of not only preserving but developing our lighting business.

Coal and Coke Exports.

Following up our record of the coal, coke, and patent fuel export business, the Board of Trade returns for August show that 3,244,565 tons were sent abroad, or 609,229 tons less than in August, 1915, and 420,917 tons less than in 1916. The total value last month reached the figure of £4,435,867, or £963,877 more than in the corresponding month of 1915, but it was smaller than in August, 1916, by £581,975, when 420,917 tons less were sent out of the country. But coalowners have the consolation of knowing that the average value of the total exports was the same—£1 7s. 4d. per ton. The eight months' exports show a good reduction compared with the corresponding period of the two preceding years, while the values have ascended. The volumes of the exports have been: 1917, 26,101,301 tons; 1916, 27,744,306 tons; 1915, 30,962,900 tons. Values: 1917, £34,893,758; 1916, £33,145,955; 1915, £25,454,699.

PERSONAL.

Lieut.-Col. W. CARMICHAEL PEEBLES, of the 7th Battalion of the Royal Scots, is home on leave for four weeks, after spending the last fifteen months in Egypt.

Mr. WILLIAM M'NAUGHTON, the Assistant Manager at the Armadale Gas-Works, West Lothian, has been appointed Assistant to the Works Manager of the Coventry Corporation Gas-Works. He has been five years at Armadale.

A very gratifying item of news was received in London last week—that Lieut.-Col. WILLIAM R. GLOVER (before the war the Birmingham representative of Messrs. Glover and Main) has been awarded the Distinguished Service Order.

Mr. JOHN DENHAM, the Assistant Manager at the Brighouse Corporation Gas-Works, has been appointed Engineer and Manager of the Whitehaven Gas Company. Mr. Denham has been at Brighouse for twenty years. The Corporation have accepted his resignation with expressions of appreciation of his work.

The Directors of the Annfield Plain and District Gas Company have appointed Mr. WALTER FROST to the position of Manager and Resident Engineer at Annfield Plain. Mr. W. Frost has been for some years under the Matlock Bath Urban District Council in charge of the Gas and Water Department, as Engineer and Manager. Some twenty years ago, Mr. Frost was appointed foreman at the Matlock Bath Gas-Works. When Mr. W. Jaffrey resigned the position of Manager ten years ago, Mr. Frost was appointed his successor.

During a dinner interval last week, at the works of Messrs. Robert Dempster & Sons, Limited, of Elland, Lance-Corporal HAROLD CHAPMAN, of the Seaforth Highlanders, a former employee of the firm, and who has gained the Military Medal, was the recipient of a presentation of a gold watch and chain and pocket wallet, the gift of the men employed at the works. The presentation was made, on behalf of the men, by Mr. J. W. Broadhead, the Managing-Director, who congratulated Chapman on what he had done, and wished him a safe return. Hearty cheers were given for the Corporal. Mr. Broadhead, replying to a vote of thanks, mentioned that 95 men had joined the Army from the works, of whom nine had been killed and four wounded.

OBITUARY.

The death has taken place of Mr. GEORGE CORRY, the Manager of the Belfast Corporation Gas-Stove Department. Mr. Corry was an excellent business man, and was greatly esteemed by the members of the Gas Committee and by the public with whom he was brought into contact.

The death has occurred at Galafoot House of Mr. FRANCIS SCOTT, Engineer and Manager of the Galashiels Gas Company. Mr. Scott was a son of the late Mr. Alexander Scott, Gas Manager of Galashiels, and was formerly Manager at the gas-works at Tillicoultry and at Kelso. Over twenty years ago he was appointed Assistant to his father at Galashiels.

The death is announced as having taken place on Saturday at Leicester of Sir EDWARD WOOD, who some years ago, in consequence of ill-health, retired from business and public life. He had had a remarkable career, achieving success by his own efforts. He was four times Mayor of Leicester; and it is declared that to his foresight was largely due the fact that the gas supply of the town was municipally owned.

THE NATIONAL GAS COUNCIL AND FUEL OIL SUPPLY.

A Letter from the Ministry of Munitions.

WE are informed by Mr. W. J. Smith (the Secretary) that the National Gas Council have received a letter from the Ministry of Munitions which, after explaining the necessity which had arisen at the end of July in respect of fuel oil, goes on to say:

> Unfortunately, in July last, when your Council's memorandum was issued, no data were in existence from which it was possible to ascertain the cost of production of fuel oil obtained by abnormal methods of carbonization; but, owing to the urgency of the situation, we were unwilling to face a postponement of a general appeal to the industry until this information was forthcoming.
>
> The efforts which have been made by the individual undertakings in many parts of the United Kingdom have now established that any additional fuel-oil that can be obtained by abnormal methods of carbonization, can only in exceptional cases be produced at a cost which is not prohibitive. As a consequence, after a series of conferences with the authorities concerned, it has been decided that while every effort should still be made to develop further the home production of fuel oil, its immediate production by abnormal methods of carbonization is not justified by an all-round review of the conditions pertaining to its production and acquirement by the Ministry, except to a very limited extent. Other means are, therefore, being taken to supplement the supply from overseas, though possibly this may be at the expense of other liquid products.
>
> In pursuance of the above decision, this Department is not authorized to continue to press your Council to develop any scheme for adoption by the gas industry as a whole; but it is as desirous as ever of entering into arrangements with individual undertakings which, by variations of their present methods, are able to increase their output of fuel oil at a cost which, though higher than the present cost, can still provide it at a price that can compare with that of other sources of supply.
>
> You will recognize that it is inevitable at times like these that steps are taken which may have to be reconsidered; and it is hoped that the many undertakings which have co-operated so promptly and loyally with us in this matter will not feel aggrieved at this change of policy.
>
> In conclusion, it is asked that your Council will make it known to the industry as a whole how greatly their work in this connection is appreciated, and will itself be assured that the information obtained by so much effort is of the greatest value, and may yet prove essential should future developments, unhappily, prove unfavourable.

In sending this for publication, the Executive Committee desire to point out:

> (1) That this matter was taken up at the urgent request of the Ministry of Munitions, with the object of inducing such works as were found to be in a position to do so to render as much help as possible in the then situation, on the understanding that cost—which it was known would be abnormal—was a matter of quite secondary importance.
>
> (2) That, as was distinctly stated in the memorandum which accompanied the circular letter of the 1st of August, and which was sent out at the instance and with the authority of the Ministry, the work was intended to be undertaken only in "all *standby* plant," and only during such period as it would not interfere with the public demand for gas, as it was fully recognized and pointed out that it would be "impossible for many undertakings to continue this work during the period of maximum demand." It was not proposed to restrict the output of gas by the employment of plant on reduced temperature carbonization of coal where its maximum output of gas was required to meet current demands.
>
> (3) That in various cases where reduced temperatures were adopted at suitable works, the results show an increase in the make of tar per ton of coal, and an even greater percentage increase of the creosote contents of the tar so produced; the reason for the Ministry abandoning the proposition being not impracticability so much as the ascertained cost combined with an unexpected improvement in the oil-fuel situation. In the Ministry's memorandum it is set out that the proposals of the undertakings experimenting in this matter had to be approved by the Ministry; so that the costs involved in these proposals could be checked before the various proposals could be officially accepted.
>
> (4) That day-to-day variations in the needs of the country's fighting forces, and consequent changes in the policy of Government Departments are matters altogether beyond the influence of the Council, which can only loyally respond as far as is practicable to every request made by the Government (whose policy in such matters is naturally, as in this case, based upon the advice of technical experts), especially when representations of such an urgent character are made as were put before the widely representative meeting of gas engineers and administrators held at the end of July.

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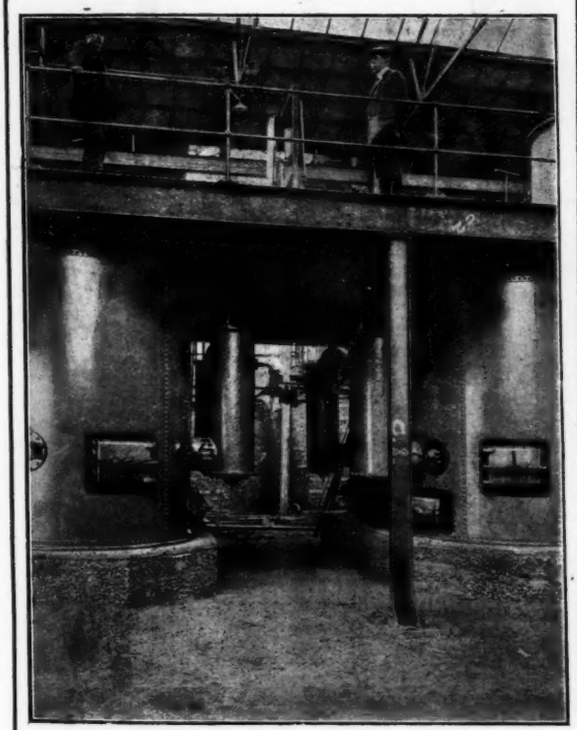

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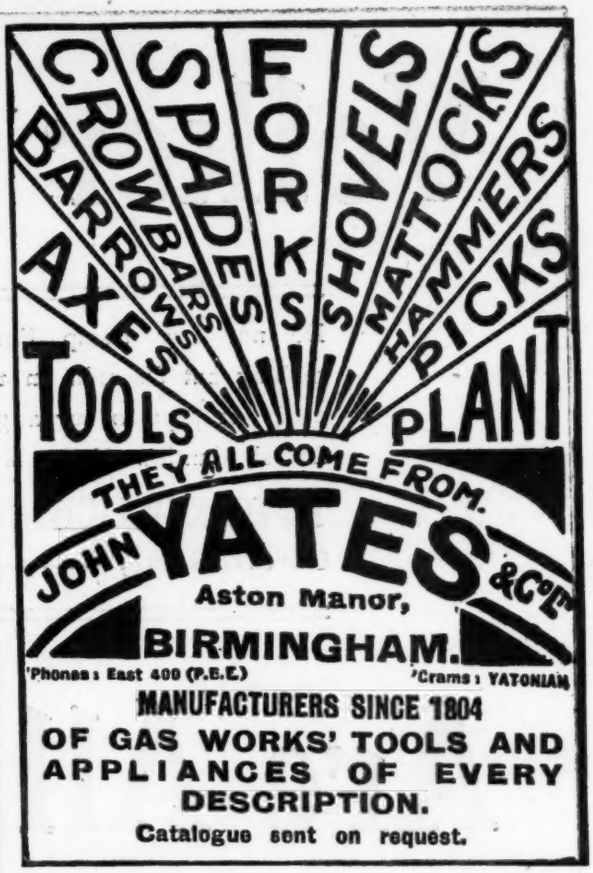

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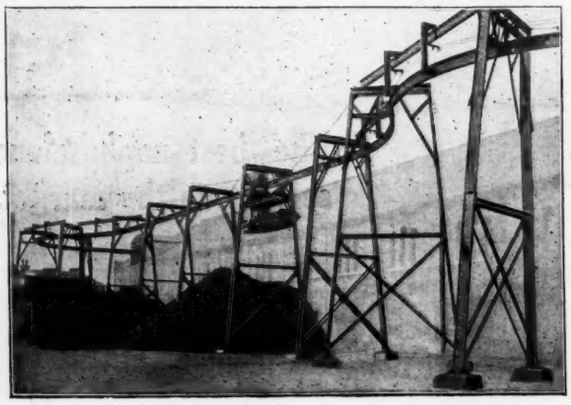

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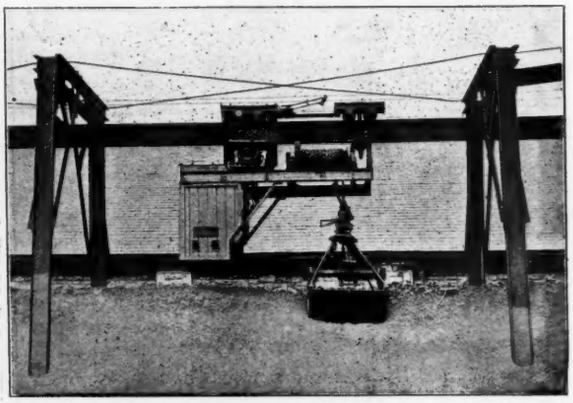

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ELECTRICITY SUPPLY MEMORANDA.

Gossip is frequently dangerous; the "Gossip" that appears in "Electrical Industries" is not immune from this trait. The other week (Sept. 4), some reflections were made in the "Memoranda" upon certain foolish strictures that the writer of the tittle-tattle in our contemporary had penned on the action of the South Metropolitan Gas Company in declining to fix on hire a gas-cooker, in current circumstances, in the house of an electric light user. The critic of the Company has returned to the charge, and shows additional ignorance and inappreciation of the commonsense of the position. He tries to make out that, at all times and in all circumstances, the South Metropolitan Company are foolish enough to refuse to fix cookers in the houses of electric light users. The electricity purveyors should be thankful for such a self-denying method of conducting business in normal times, seeing that it leaves open the field for the entry of the wonderful electrical contrivance that, no matter relative temperature conditions, declines (according to electrical declaration) to waste meat to the same extent as, but costs more to do a corresponding amount of culinary work than, the gas-cooker. Such indifference to its interests on the part of a gas company should be welcomed and blessed by electrical folk; but there is this particular individual heartily reproaching the South Metropolitan Company for doing a good service to the electricity supply industry. The absurdity of his position on that one point needs no further comment. There is another aspect of the matter which also proves the stupidity underlying his arguments. Gas-cookers are far better all-the-year-round gas consumers than a number of incandescent gas-burners, especially in days of summer time daylight saving. A dwelling-house using 5 or 10 c.ft. of gas per hour for lighting is a poor customer compared with a house with only a gas-cooker installed, drawing gas from the holders morning, noon, and night, and not only during the hours of heavy demand for lighting. This being so, where is the sense in rejecting, if it can possibly be avoided, the gas-cooker user, whose consumption would be greater than if he was a consumer of gas for lighting only? Our contemporary's persistence in displaying ignorance over facts is both interesting and amusing. The description we gave of the war time difficulties of gas undertakings is characterized as "pathetic." We fail to see anything "pathetic" in such a plain, straightforward statement of hard facts. He also finds inconsistency between those facts and the advice to householders to use more gas. Our sympathy for such intelligence increases. If he again reads what we had to say a fortnight since, he will see that particular emphasis was laid on the point that the supply circumstances of gas undertakings largely differ in these times. Many of them are in a position to supply more gas to householders with lighting appliances, cookers, gas-fires, and other appliances already fixed; but perhaps these concerns, through labour and gas appliance shortage, are unable to make any new connections. So we may place among the other absurdities of the electrical writer the remark: "The British Commercial Gas Association ought really to protest against the Government adding so cruelly to burdens which are already overwhelming." Our advice to this critic is that he should try to look at matters from all sides, and not from a single one. This is the only method of avoiding the making of such foolish muddles, as many practical electricians who read these notes will confess have been made on this occasion by the writer in "Electrical Industries."

Electrical Arguments and Absurdities.

How to Spur-up Corporations with Electricity Undertakings.

Uses that were not intended can be made of even a Departmental Committee. Mr. L. W. Woodman, the Electrical Engineer of Dover, has found one such use. He has been employing the appointment of the Board of Trade Electric Power Supply Committee to spur-up his own Committee into taking a larger view of the electrical life, or accept the consequence of electrical extinction for being unfaithful to the fullest possible utilization of their supply functions. Mr. Woodman has told the Corporation that the Board of Trade Committee are going to see that the supply of electricity is adequate and cheap in all districts for manufacturing purposes. The duty of the Corporation and all other corporations is therefore to consider how far they can meet the demands in their districts. If they are not prepared to provide an adequate supply, then Nemesis. Some big absorbing concern may come along, or they may have to take electricity in bulk from a large external power station. The whole point for the Corporation is to protect their interests by action. It seems that three times since early in 1915, the question of additional plant for Dover has been considered, but on each occasion it has been thought better to postpone it. When the matter came before the Committee the other day, the members grasped Mr. Woodman's meaning, which was that the Corporation should say what they were prepared to do after the war, so as to prevent an outside authority coming in, and doing it. Mr. Woodman has got his eyes on the East Kent Power Company, and a proposal to supply Dover from Tilmanstone power station. The Corporation of Dover are like other municipal bodies—do not want to relinquish any of their statutory privileges. They are still, as the Electrical Correspondent of "The Times" would uncharitably say, obsessed more by the retention of municipal privileges than by national interests, which is as may be. There are differences of opinion on the subject. Stimulated by Mr. Woodman's application as a spur of the Departmental Committee, the Corporation have announced that they have under consideration the advisability of extending their undertaking by the erection of another station outside the borough, with a view not only of meeting the needs of the existing area at the present time and in the near future, but to supply a larger area. That is to say, they ask forgiveness for any shortcomings in the past, and promise to do better in the future. They have also some respect for the capital already expended, and fear a detrimental financial result if not allowed to adopt a scheme of development all "on their own." It was not at all a bad idea on the part of Mr. Woodman—he is a good engineer—to stimulate a pronouncement of policy in this way.

Cable or Railway Wagon.

There is much talk of the economy of the generation of electricity at the pit-head and transmission therefrom; but insufficient comparison has been made as to whether the transmission would be dearer than still clinging to the old railway wagon and transmitting coal. "D. V. M." in the "Electrical Times" once before discussed the question of "Pipe-Lines *v.* Pole-Lines," and reference was made to it in our issue of July 17. He has lately been considering the cognate question of the cost of electrical transmission and the cost of coal transmission by rail. He has taken the trouble to find out the total price of coal and the cost of railway freight and cartage for a few typical electric power stations—not the largest of their kind, nor the smallest. He finds that the average cost of coal per ton delivered is 168d.; and the average cost of rail and cartage, 50·5d.—the latter being 30 p.ct. of the cost of the coal. He asks whether it will pay to replace the 30 p.ct. by (*a*) transporting fuel in some other manner or in some other form? and (*b*) establishing super-stations at the pit-head, and transmitting electrical energy in bulk? He assumes that the rail and road coal transport which costs 50d. per ton corresponds to a long transmission line. This would involve generation at a pressure A, stepping-up to a main line voltage B, and stepping-down to a local high pressure C. Here two sets of transformers and three systems of conductors are involved. What will the total losses be? Assuming a load factor of 30 p.ct. and a fairly good power factor, the losses are likely to be quite 15 p.ct., unless too much money is laid out on the line. Taking a loss of 15 of every 100 units generated at the pit-head, 85 units are delivered on the bus-bars at the other end. A ton of coal, at a 30 p.ct. load factor, corresponds to a production of 1000 units, which means a high efficiency plant, absorbing only 2·24 lbs. of coal per unit, which is magnificent working. He assumes that the cost of the long-distance transmission might be anything over 0·09d. per unit; it could not well be less—in fact, interest and depreciation alone would be about 0·06d. The expense of transmitting the 850 units would, at 0·09d., therefore amount to 76d. To carry the ton of coal, which should produce at the local high efficiency station 1000 units, would cost 50d.; while the cost of transmitting 1000 units from the pit-head would (850 units costing 76d.) cost 90d. In the particular average case chosen, it is cheaper to carry coal than electricity, even at the present high railway rates; and this in itself seems to "D. V. M." to constitute a damning stricture of the electricity transmission scheme. Of course, the comparison is built upon a corresponding generating efficiency; and there are not many local stations that can claim that they would not require more than a ton of coal to generate 1000 units. There are not a few that would be glad if they could generate 500 units per ton.

Other Economic Considerations.

But one cannot abstract a question of economy from all else, and say that the result is all profit without any discounts. We will assume that the coal is to be carbonized at the pit-head. The coke too would in part have to be gasified. But coke (with a heating value of say 14,500 B.Th.U. per lb.) is wanted about the country as well as electrical energy, which imparts 3420 B.Th.U. per unit with apparatus (when found) of 100 p.ct. efficiency. We say nothing about those people who have a liking for heat energy in the gaseous form—rendering 500 B.Th.U. and over per cubic foot. Coke, however, occupies in the wagon or ship's hold more room per ton than coal; and so it is preferable for the coke to be produced locally rather than be brought scores or hundreds of miles by rail. Then, if there are these huge carbonizing plants at the pit-head, there will still be the need for the transmission by rail of the liquid products to the chemical factories about the country, unless the chemical factories chose to spend a large amount of capital by moving to the pit-head. Perhaps rather than do this, they will continue to patronise any gas-works that may survive the electrical revolution. But assuming chemical works concentration about the pit-head, there would still be the chemical products to distribute throughout the country, which is largely assisted at the present time by the chemical works themselves being distributed and not concentrated. Another aspect is that, assuming the concentration about the pit-head, many districts about the country would be robbed of their industries; they would be impoverished; and the towns in the already well-revenued colliery districts would become the richer at their expense. It is patent that the question of transmission of coal by rail or energy by cable is not one that can be separated from all other considerations. "D. V. M." doubts

the economy of power transmission by wire on figures of his own presenting. Add to his findings other considerations such as we have shown here come into the calculation from the national economy point of view, and electrical energy transmission has to put up a very strong case to succeed.

Gas Production and Transmission in Excelsis.

In his article "D.V.M." asks gas engineers to supply him with the factors to enable him to compare with electrical transmission the cost of compressing and transmitting gas. If gas can be transmitted at high pressures so easily as to make it a commercial proposition—"if gas fuel can be sent out from the pit-head at some such cost per heat unit per mile as that pertaining to petroleum—then the railways are undone, and electricity's fortune is made." We are afraid that experience in this country of high-pressure gas transmission is not great; it is all on a relatively small scale. Gas is sent from Beckton to London by high-pressure mains. Most gas undertakings of any note have their high-pressure boosting systems; many have high-pressure systems for feeding distant outlying areas; and there are the general high-pressure lighting systems. But these are not quite the same thing as "D.V.M." has in mind. He is thinking of higher pressures and long-distance transmission. But, anyway, the work could be done cheaply. With steel mains and welded joints, the losses would be low. The steel mains, compressors at one end, governors at the other, valves here and there for control, and syphons for dealing with any liquid deposition, constitute the equipment. A high-pressure gas system is a simple thing. But for reliable factors we would suggest that he should go to the source whence he obtained his particulars as to the cost of the high-pressure transmission of oil—the United States. There he could get all he wants from the large experience with long-distance natural gas transmission. Over here (as we have no natural gas within sight worth speaking about), while believing in the consolidation of gas production for suitable areas, the balance of economy, taking all things into account, is considered to be not on the side of pit-head carbonization and then transmission of the products, but on that of conveyance by sea or rail of all that coal contains in the concentrated form in which Nature has presented it, and then dealing with it and separating the constituents close to the place of consumption. Nature was very wise; there are some specimens of humanity who do not think much of her wisdom, and would undo it.

Competition for Electric-Cookers.

The Société Générale Italienne d'Electricité Edison evidently do not think the electric-cookers at present on the market are all they should be. They have, so the "Génie Civil" says, opened a prize competition for the construction of an electric cooking outfit of the thermal storage type, designed to consume as little energy as possible, and to spread the daily demand over the longest possible period; the criterion being the ratio between the consumption in KW. hours and the maximum demand in KW. The conditions are that before March 31, 1918, at least three samples shall be submitted, suitable for a family of five or six persons, as well as particulars of smaller and larger sets. The Société Edison has placed 10,000 lire (£400) at the disposal of a Commission for distribution in the form of one or more prizes. The condition, "designed to consume as little energy as possible," will be noted. Work requires a certain amount of heat; the unit of electricity has a value of 3420 B.Th.U.; and the average consumption of coal in this country to obtain the unit is 4½ lbs., or about 75,000 B.Th.U. It can be done for (say) 43,500 B.Th.U.; but it is a question of modern plant. The 4½ lbs. is the average—probably the average is higher at present with the ash and rubbish laden coal now being sent to large consumers, and for which they have to pay exorbitant prices delivered.

Maximum Prices for Tar Products in Switzerland.

According to the "Journal für Gasbeleuchtung," the Swiss Government fixed the following maximum prices for tar and tar products for the month of August last: Distilled or refined tar, in tank wagons, £7 18s. 6d. per ton, increasing to £13 per ton for quantities of less than a single barrel; mixed tar oil, including green oil, £17 9s. 6d. per ton in tank wagons; crude carbolic oil, £18 14s. per ton in tank wagon lots; soft pitch, in wagon loads, £7 18s. 6d. per ton; medium and hard pitch, in wagon loads, £7 14s. 6d. per ton. Appreciably higher prices are in all cases permitted for sales in smaller receptacles than wagons. Prices are for removal from the distillery or gas-works in the buyer's wagons or other receptacles. These prices are stated to be distinctly higher than those hitherto prevailing for all items except crude carbolic oil.

A Committee of the Manchester, Liverpool, and Counties Commercial Motor Users' Association have arranged for a paper to be read on Friday, Oct. 12, at 7 o'clock, in the Midland Hotel, Manchester, by Mr. W. M. Barrett, of the Manchester Corporation Gas Department. The paper will deal with "Coal Gas for Motor Traction;" and it will be illustrated by lantern slides. Non-members of the Association who would like to be present will receive an invitation on addressing the Secretary, Mr. Ellis Green, Cromwell Buildings, Blackfriars Street, Manchester.

THE COAL SUPPLY OF GERMAN GAS-WORKS.

THE market report, dated Aug. 18, which was published in the "Journal für Gasbeleuchtung" of Aug. 25, disclosed some interesting facts as to the conditions subsisting at the time in regard to the coal supply of German gas-works.

The report states that the Imperial Commissioner for the Distribution of Coal, having at last realized the imperative necessity of furnishing gas-works with more coal, had imposed on the coke-oven works a reduction of 6 p.ct. of their June-July output of coke in so far as one month from Aug. 15 last was concerned. This measure, though only provisionally adopted for one month, should set free 200,000 metric tons of coal for the supply of gas-works. How imperative such a measure had become was shown by the fact that, according to our German contemporary's report, at most German gas-works there was then never more than one week's consumption of coal in store, and frequently much less. Thus the gas supply of the towns is at the mercy of the slightest interruption in the delivery of coal. Meantime, according to the orders of the Coal Commissioner, supplies for domestic use are to be put on the same footing as for factories doing war work; while agricultural supplies, under the direction of the Imperial Grain Bureau, are being distributed through the local authorities. Thus overlapping occurs, and some consumers receive double the supply which they should. It remains to be seen whether the collieries can cope with the increased call upon them; but having regard to the natural withdrawal of labour, and the wear and tear of plant, an increase of 10 p.ct. on the previous month's output can scarcely be expected even in the most favourable cases.

The coal market continued to display the same discrepancy between supply and demand. Stocks of coke also were gradually being exhausted; and scarcity of it also was impending. Want of fuel was felt even in South Germany, which had hitherto been given a preference in supply. The Coal Commissioner now, however, promises uniformity in deliveries to all parts of the Empire. An order made by the Commissioner on July 20 prohibited the transport of any gas coke to railway stations outside a radius of 30 kilometres [about 19 miles]. The hope was expressed that this order, as well as the rationing of consumers with gas, may be revoked as a result of a better realization of its import.

COAL FIGURES FOR 1916.

OVER the signature of Mr. W. Walker (Acting Chief Inspector of Mines), there was issued last week Part I. (Divisional Statistics) of the Home Office report on Mines and Quarries for 1916. Some of the figures will be dealt with more fully when Part III. is published.

It is stated that in the twelve months ended December last the total output of coal in the United Kingdom from mines under the Coal Mines Act was 256,348,351 tons. Adding to this 27,015 tons from open quarries, the total output of coal was 256,375,366 tons, against 253,206,081 tons the previous year. There was thus an increase of 3,169,285 tons over 1915, which year showed a decrease compared with 1914 of 12,458,312 tons. Turning to the district inspector's report, it seems that the output under the Coal Mines Act compared with 1913 and 1914 was 7,313,233 tons and 3,565,360 tons less respectively, but was 430,927 tons more than in 1915. If the traffic could have been dealt with, the men could have worked more time, and more coal would have been produced. In the Northern Division the output was 47,270,124 tons, as against 47,030,285 tons for 1915; and the increase would have been more, if the exigencies of shipping had allowed. The number of persons employed at the end of the year was 191,338, as compared with 184,124 twelve months earlier. This increase was mostly accounted for by men returned from the Colours to resume work in the mines, and by a number who having in the early months of the war volunteered to do munition work have since been released for mining. The output of coal and other mineral from coal mines in the Yorkshire and North Midland Division was 68,471,139 tons, and 67,983,983 tons in 1915; the increase in output being thus 487,156 tons, with an additional value, owing to higher market prices, of no less than £9,182,704. The increase in the output of coal amounted to 501,275 tons. The proportion of coal produced by coal-cutting machines was about 11·3 p.ct. of the whole output of the division. The shortage of workers occasioned by the war was reduced from 31,789 at the end of 1915, to 21,539 in 1916.

There was an increase in the number of persons employed in the Lancashire, North Wales, and Ireland Divisions of about 5 p.ct., though there is still a substantial deficiency as compared with 1914. A number of discharged soldiers have returned to their former employment, and there has been an influx of persons from other trades. In spite, however, of this increase in the number of persons employed, there was a reduction in the quantity of coal obtained of 10,762 tons. This reduction, it is said, may be largely accounted for by the fact that the greater proportion of the men who have left the mines for military service are young men who are capable of producing a larger output than the older men who have to some extent replaced them. The total number of persons returned as employed at coal mines in the South Wales Division in 1916 was 214,100, which was an increase over the

preceding year of 11,445 persons, or 5·6 p.ct. The output of coal was 52,080,709 tons, which was an increase of 1,628,109 tons, or 3·2 p.ct., over the preceding year. In the Midland and Southern Division, also, there was an increase of some 4 p.ct. in the number of persons employed. The total output of minerals under the Coal Mines Act was 29,202,297 tons; the increase in the output of coal being 312,569 tons.

The number of mines at work during 1916 under the Coal Mines Act in Great Britain and Ireland was 2847, and of persons employed under and above ground 998,063. In the preceding year there were 2871 mines at work and 953,642 persons employed. Of last year's total, 792,911 males were employed underground.

There were in 1916 accidents which caused 1313 deaths in mines working under the Act, compared with 1297 the previous year. The figure for last year represents a death rate of 1·32 per 1000 persons employed in mines, and of 4·92 from all accidents per 1,000,000 tons of mineral raised.

FEDERATION OF GAS ENGINEERS.

WE have received from a correspondent intimately connected with a large firm of gas apparatus constructors the draft of a proposed "Federation of Gas Engineers." In asking for its publication our correspondent desires that his name be not mentioned. In the course of a covering letter, he writes: Your article on "Indirect Profiteering in Coal" is of great interest, and also Mr. John West's suggestion that the gas undertakings should make a united stand against this imposition. May I, therefore, put forward a scheme which I have worked out, and which I believe would be beneficial to the industry in general. The old French proverb, "L'union fait la force," has been proved times without number during the present crisis. Therefore why should the gas industry not arm itself, and unite in a sort of federation, which would have beneficial consequences both during these troubled times and also after the war. Indirectly, I believe that it would also assist the various Government Departments."

PROPOSED FEDERATION OF GAS ENGINEERS.

The Federation would have the object of assisting gas engineers with every detail concerning the industry, and be worked under a board of gas engineers, elected annually at the Institution meeting. The board would sit (say) every month, and consider the various complaints and suggestions brought forward to the Federation.

An office should be attached to the Federation, which would collect various details required to further the interest of the gas industry.

The object of the Federation would be to deal with all instructions from the various Government Departments, and advise the Government Departments on subjects relating to the gas industry—such as coal, tar, benzol, &c.

It would assist those engineers who are in difficulty and require advice as regards difficulties arising in the works, labour, &c.

It would deal with any details that arise and disputes for the good interests of the gas undertaking.

The office attached to the Federation would also collect useful information—such as consumption of coal, prices, &c., manufacture, sales, &c., gas tar, &c., labour employed, prices paid, &c., also difficulties, improvements effected to plants, and experiences from various engineers, and would communicate same to all engineers, through the means of a "Monthly Bulletin."

Such a Federation would bring a closer union among gas engineers, and assist all those who are in difficulty.

The Federation could be made self-supporting, by means of charges (tabulated hereunder), which would enable small undertakings to derive the same benefits as the large ones.

Works producing up to 10 million c.ft. per annum				£1	1 0
From 11 million to	50 million c.ft.			2	2 0
,, 51 ,,	100 ,,			4	4 0
,, 101 ,,	250 ,,			6	6 0
,, 251 ,,	500 ,,			8	8 0
,, 501 ,,	1000 ,,			10	10 0
,, 1001 ,,	upwards			14	14 0

An entrance fee amounting to one year's subscription could be made to overcome the initial capital expenditure.

The marriage took place last Thursday, at St. John's Parish Church, Croydon, of Vivian Desmond Ryan, younger son of Sir Gerald and Lady Ryan, of Hintlesham Hall, Suffolk, to Miss Kathleen Frances Helps, second daughter of Mr. James W. Helps, M.Inst.C.E., of Berisal, Normanton Road, South Croydon.

The half-yearly meeting of the North of England Gas Managers' Association—presided over by Mr. Richard Nelson—will be held at the Gas Office, Newcastle-upon-Tyne, on Saturday, the 6th prox. In addition to the address of the President, Mr. Harold H. Collett, of Leeds, will read a paper dealing with "Some Experiences with Intermittent Verticals." Tea will be served at the close of the meeting.

According to the "Engineer," an American firm has developed an optical pyrometer for works' use in which the luminous radiation from a heated body is balanced against that from a standardized light source. The instrument is designed for measuring temperatures from approximately 1100° Fahr. to the highest known—a screen being employed to reduce the light from bodies having temperatures in excess of 2500°. The instrument is portable, weighing but a few ounces, and can be sighted, it is emphasized, as easily as an opera glass. The case containing the storage battery, rheostat, and milliammeter, employed in connection with the pyrometer, weighs approximately 10 lbs., and is designed to be slung around the neck of the operator.

THE SLIDING-SCALE AND DISAPPEARING DIVIDENDS.

By ARTHUR VALON, M.Inst.C.E.

THE reluctance shown by the chairmen of the larger gas companies to make a definite effort to obtain a revision of the sliding-scale arises, no doubt, from a patriotic preference. They would rather suffer diminished dividends than even appear to draw profit from the necessities of their country. It must, however, be pointed out that they are—mainly, at any rate—men to whom lessened dividends may be inconvenient, but are not calamitous. It is "very otherwise" with the great majority of holders of gas stock and shares in the country generally. For, from the nature of the investment and the action of the auction clauses, the element of speculation which is present in most investments is reduced almost to vanishing point; and the regular, if low, rate of return on money invested makes a strong appeal to those small investors to whom safety and regularity are essential, because upon them depends their daily bread.

A continuation of the present conditions means the certain destruction of this reputation, and a consequent reduction in the numbers of the investing clients; while, in any case, present experiences are bound to react unfavourably on the popularity of investment in sliding-scale companies. The effect on the cost of raising gas capital in the future is easily foreseen. With Government stock at 5¼ p.ct., and the large demand for capital for industrial purposes inevitable so soon as the war ends, the prospect for gas companies is none too encouraging. It is, therefore, an insufficient reason for inaction that, in some cases, the warm glow of conscious altruism should be considered a sufficient return for financial sacrifice.

The sliding-scale has been so widely adopted among gas companies that its general working is well understood; and that its equitable working depends upon a fair standard price, will be conceded. The methods, however, by which a standard price is fixed appear frequently to be misapprehended. As one who has assisted in fixing many standard prices, I shall risk the charge of engaging in a work of supererogation, and set out the principles in accordance with my experience.

When a company applies to Parliament for a sliding-scale, it has usually been working for some years with a maximum dividend, and generally has paid a maximum dividend of 10 p.ct. on its original shares. To pay this dividend under the economic and industrial conditions at the time, it is necessary to charge a certain price for the gas sold to ordinary consumers; and it is this price which is the true standard price—the previous maximum dividend being made a standard dividend. In many cases a small margin is allowed, and the standard price is fixed a little higher than it would be on the foregoing principles. This is in order to cover what may be termed normal fluctuations in the market price of materials and labour. It is not intended, and it would clearly be totally inadequate, to cover a land-slide in economic conditions.

Now if this process is considered, it will be seen that the standard price is fixed to cover the normal cost of supplying gas, including a dividend at the standard rate; and it is so fixed in order to give the company a reward for good management, so that, if by economy the cost of supply can be reduced, the shareholders may be allowed to divide an increased dividend.

One frequently hears it stated that the standard price must not be interfered with, because it is the result of a parliamentary bargain. Frankly, I do not understand the exact sense in which this term is used. The real parliamentary bargain is the bargain between the authorities and the company, that the company shall exercise every economy, and the authorities will then allow them to increase the dividend beyond the standard dividend. If it is meant that the standard price is fixed by a bargain between the promoters and the opponents of the Bill, it is an inaccurate statement, except possibly in regard to a small number of special cases. It may be that the promoters and opponents differ as to what the standard price should be; but they do not differ as to the principles upon which it should be fixed.

It will be seen that the base factors of the standard price are:

Net cost of coal,
Cost of labour,
Cost of capital.

For the purpose of the standard price, these factors are looked upon as fixed, except for small market fluctuations. If the company can reduce the cost of gas by due care and management—by, for instance, the introduction of more economical plant, or by more economical methods of working, in short, by more efficient management—this will entitle them to increase the dividend. If, however, economic conditions alter, so that the price of coal increases (say) 50 p.ct., and the wages of labour proportionately, it is clear that the company are robbed of their dividend by circumstances not under their control, and which could not be prevented by due care and management.

Take a company which had a standard price of 3s., and had by economy reduced the price of gas to 2s. 6d., and were paying an increased dividend. The economic conditions change, and the price of coal and labour goes up, so that in order to cover these it is necessary to increase the price of gas to 3s. 6d. It will be observed that the whole reward of the company for its improved management has been swept away, and in addition it has

to reduce its dividend below the standard dividend—*i.e.*, below the dividend which it would have been able to pay under the old maximum price. If there ever was a parliamentary bargain, it is pretty clear, in these circumstances, that while the company have still got to fulfil their part of the bargain of carrying out their work with every economy, the reward which is the other side of the bargain has disappeared altogether—indeed, become a minus quantity.

It is also evident that, had the cost of labour and coal been at their present level at the time when the standard price was fixed, this price would have been not 3s. but 4s.; and, in strict equity, the price should be altered to that figure. It has, however, been suggested that it would be impolitic to demand an alteration in the standard price which would permit of the pre-war rate of dividend. There is some force in this contention, but purely as a matter of sentiment. The value of capital has gone up; and where it has been possible to increase the price of an article to give the new rate of return on capital, it has been done. In the case of gas companies, even if they were allowed to pay the pre-war rate of dividend, they would only be dividing the lower pre-war market rate of money by the action of the auction clauses. This must always be considered in relation to the sliding scale, and is a most material point.

When capital is issued by a company paying a dividend higher than the standard dividend, the premium paid by the investor brings the actual dividend paid by the company to that investor down to the market rate at the time of investment. The real standard rate of dividend for the investor is not the nominal standard dividend fixed by Parliament, but the actual dividend at the time of investment; and the real standard price the price of gas which allows this dividend to be paid. Previous to the war, the market rate was round about 5 p.ct., and provided an investor continued to obtain that he had not much to grumble at. But when this comes down by the action of the sliding-scale, it is no consolation to him to say that the company is still paying its standard dividend. And it is for this reason that the proposal that has been made, that the company should be allowed to pay up to its standard dividend, would not meet the requirements of elementary justice.

For instance, with one company which has an old standard price (fixed years ago) of 4s., the actual pre-war price of gas being 2s. 6d., which has been increased by 1s. up to 3s. 6d., the dividend paid is still in excess of the standard dividend. Another company has a standard price of 3s., and has never reduced the price of gas below this figure, but has had to increase it to 4s. to meet increased costs. It is clear that if the latter company were allowed to pay its standard dividend, there is no loss at all; whereas in the former case there is a very serious one.

Although it is easy to show that any cast-iron proposal of this sort will not give equal justice to all, it is not so easy to suggest any simple method by which this desirable result can be obtained. The examination of accounts of the companies principally affected will show that the greater part of the increase in cost is due to an increase in net cost of coal and oil. There have, of course, been serious increases in other items, but they have been minimized by reductions in maintenance charges and in other ways. Probably therefore substantial justice would be done if the standard price were increased in proportion to the net cost of coal. While there are many objections to a moveable standard price, these would probably not be insuperable for a temporary measure—say, for five years.

As to the method by which the alteration can be effected, it is strange that it does not seem to have occurred to the people most concerned, that the whole difficulty has arisen owing to what has become an inequitable provision in various Private Acts of Parliament. The obvious and ordinary way of dealing with such a matter is to apply to Parliament for a revision of the standard price. It hardly seems probable that Parliament will refuse to consider the matter; and the case is so strong that it would not seem possible that no relief would be afforded. The cost of such an application is hardly worth serious consideration if the relief sought is likely to be obtained. Time, however, is passing, and if everybody continues to wait for somebody else to begin, or for some *Deus ex machina* to confer the wished-for boon, nothing is likely to happen, except that the present conditions, or worse, will be prolonged for another two years at least.

Calorific Standard Application and Orders.—An application under the Gas (Standard of Calorific Power) Act, 1916, has been made to the Board of Trade by the Gosport Gas and Coke Company; the power proposed being 500 B.Th.U. Orders have been made by the Board for the Barnet District Gas and Water Company and the Sittingbourne District Gas Company.

Bronze Medal in "Gas Supply."—The Bronze Medal for the Ordinary Grade in "Gas Supply" given by the City and Guilds Institute has been awarded to Mr. Percy Marsland, with the Longwood and Slaithwaite Gas Company. Mr. Marsland is serving articles to Mr. J. H. Brearley, the Engineer to the Company. He received his tuition in "Gas Supply" at the Huddersfield Technical College; the teacher of the class being Mr. E. L. Oughton, the Sales Manager and Distribution Superintendent of the Longwood and Slaithwaite Company. Mr. Marsland is a son of the late Mr. John S. Marsland, who, at the time of his death, was the Managing-Director of Messrs. Drakes, Ltd., of Halifax.

SIXTY YEARS AGO.

From the "Journal" of September, 1857.

Early Comparisons of Cost.—There is an important paper by M. Edmond Becquerel upon the electric light, in which that distinguished French *savant* attempts, we believe for the first time, to institute a comparison between the relative cost of that system of illumination and those at present in general use. The well-known ability of the author entitles his opinion on this subject to our respect; but we are nevertheless unable, for many reasons, to give our assent to his conclusions with regard to the comparative cost of equal lights from gas and from electricity. M. Becquerel himself admits that the figures he gives are not quite correct, because in estimating the cost of the electric light, only the materials consumed are charged; whereas the prices he quotes for gas, which are those at which the Paris Gas Company supply the public lights and their private consumers, include the whole expenses of manufacture and distribution, as well as interest on the capital employed, and a sinking fund for its reimbursement. The cost of the electric light is consequently underrated, while that of the gas is exaggerated. But a far greater error lies in the mode by which the luminiferous value of the two agents was determined. To compare an electric light of 350-candle intensity with an ordinary gas-burner of perhaps one-thirtieth part of that power, and thence to deduce the relative illuminating power of the two agents, is to place the gas at an immense disadvantage. It is easy to construct a burner, by which a sufficient quantity of gas may be perfectly consumed, to yield a light equal to the electric light. Mr. Gurney's "Bude light," and the Liverpool "Sun burner," are examples of what may be done in this respect.

Manure from Coke and Gas Liquor.—Having noticed the remarks in your "JOURNAL" relative to the unsaleable coke in different gas-works causing much loss, I beg to suggest that, by pulverizing it, and impregnating it with gas-water, it might be made into a valuable manure; the ammonia in the gas-water being fixed by sulphuric acid, &c. When sold to the farmer, in the above prepared state, it would be found very valuable for his grass lands, cereal crops, and his turnips, when drilled-in with the seeds; having myself found by experience that Boghead charcoal and soil, impregnated with gas-water, and sown broadcast on the land, conduces to a healthy growth of vegetation. By the use of gas-water, the artificial manure manufacturer increases the value and fertilizing properties of his manure; and in the above simple use of coke, impregnated with gas-water, the necessity of diluting the latter with water, and then putting it on the land with a watering-cart, is done away with, at the same time that the strength of the gas-water does not check the growth of vegetation. The breeze also could be impregnated as well as the coke. The value of ammonia being about £60 per ton, the percentage of ammonia taken up by a ton of pulverized coke could be ascertained, and its value per ton for agricultural purposes determined. [Signed, John Malam.]

Sensitiveness of Plants to Poisoning by Illuminating Gas.

The "Pharmaceutical Journal" reproduces from the Chemical Abstracts in the "Botanical Gazette," 1917, No. 11, p. 1447, a summary of an article on this subject by S. L. Doubt. He points out that increasing loss of plants in greenhouses and trees in streets in American towns is attributed largely to coal gas poisoning. From their sensitiveness in this respect, tomato plants, *Salvia splendens*, *Mimosa pudica*, *Ricinus communis*, *Datura stramonium*, and *Dianthus caryophyllatus* are recommended as test plants. In all these, except the carnation, 50 parts of coal gas per million of air cause epinastic growth of petioles; and the flower buds of carnations wither in this degree of atmospheric gas pollution. A dilution of gas 1:1000 causes the leaves of all these to fall off, as well as from *Coleus* and *Hibiscus rosa sinensis*. Ethylene alone gives similar results. The following plants are found not to be affected by a concentration not exceeding 1:400 of illuminating gas in air, which is the smallest amount that can be detected by smell: *Calladium esculentum*, *Lupinus perennis*, *Eriobotrya japonica*, *Phœnix canariensis*; *Conocephalus sp.*, *Canna*, *Achyranthes indini*, *Altermanthera sp.*, *Cytisus canariensis*, and species of *Polypodium*. Many trees, including elder, ash, elm, lime, and catalpa—are very sensitive to gas escaping into the soil. Simple tests are detailed by means of the above-named gas-sensitive plants to detect small amounts of atmospheric contamination.

German Illuminating Engineering Society.—The announcement of the fourth annual general meeting of this Society, which was to be held on Saturday, the 15th inst., at the Imperial Physical-Technical Institute at Charlottenburg, gives the following agenda: Report of the Council and other private business; report by Dr. H. Lux, of Berlin, on the "Inception, Organization, and Programme of Committee No. IV., which deals with the Practical Lighting Questions;" paper by Dr. Bloch, of Berlin, on "Uniform Evaluation or Marking of Sources of Light;" and a paper by Dr. Halbertsma, of Frankfort-on-the-Maine, on "Diffusion of Light as a Means of Diminishing the Surface Brightness of Artificial Sources of Light." The President of the Society for the current year is Dr. E. Warburg.

WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION OF GAS ENGINEERS AND MANAGERS.

Half-Yearly Meeting at Briton Ferry.

IN spite of war worries and inclement weather, there was a very good attendance last Wednesday at the Autumn Meeting of the Institution, which was held at Briton Ferry, the home of the new President (Mr. J. Mogford), who delivered his Inaugural Address, and on the conclusion of the business entertained the members at luncheon. The proceedings included a paper by Mr. W. H. Cattell, the Chief Salesman of the Swansea Gas Light Company, on "Promoting Gas Sales;" and the discussion on this had not concluded when the time for adjournment had been reached. In the afternoon, there was much of interest to be seen; and altogether a profitable day was spent.

The Business Meeting was held in the Briton Ferry Council Chamber; and at the outset of the proceedings, Mr. J. E. KENSHOLE, of Merthyr Tydfil (the retiring President), occupied the chair.

A WELCOME.

Mr. GEORGE DAVIES (the Chairman of the Urban District Council) said that his duty was a brief and pleasant one. It was just to welcome the Institution to their town, which was a very small one. They laid no claim to any great fame or notoriety as a public body; but they felt the Institution had added some dignity to them by electing their Gas Manager, Mr. Mogford, as their President. This they looked upon as reflecting credit not only on Mr. Mogford, but also upon the Council whom he had served for the past twenty years. The Council appreciated the honour equally with Mr. Mogford, having always looked upon the Institution as serving a very useful purpose. They had tried to carry out what they considered to be the chief duties of a local body mainly concerned with the health of the people; and they had, he believed, always been advised wisely and well by their officials, and chief among them Mr. Mogford. His (the speaker's) own experience, gained in the time during which he had taken part in public life, was that all councils would be well guided if they acted more consistently with the advice that was tendered to them by their officials. Speaking of a body like the Briton Ferry Council, which was chiefly composed of what might be called the democratic element—that was to say, there were no men of great means who took any keen interest in local affairs, and the members were elected largely, if not solely, from the working classes—the general impression was that their main duty was to see that they had a sprag under the wheel of the public official. There was an idea at the back of the heads of the people that the chief function of a public authority was to discourage expenditure advised by their officers for the improvements which were necessary for carrying on work successfully in a town like Briton Ferry. But the Council, though bound by the restrictions put upon them, and by the limitations imposed by the low rateable value of the district, did their best to keep abreast of requirements, by acting upon the advice tendered from time to time by their officials. These officials were quite twenty years ahead of the members of the Council in all that was done; but the Council tried to keep up, as far as lay in their power, regardless of criticism from the outside with respect to expenditure. It was only fair to say, too, that if the public in general in the neighbourhood had been as far-seeing as Mr. Mogford, if employers and those who owned industries had looked as far ahead as their Gas Manager had, they would have been better off now. For the past ten years Mr. Mogford had been making suggestions which might have been detrimental to him personally, and yet would have been economical from the engineer's point of view, and would have served the interests of the public a great deal better than things as they now existed with respect to power and light. He welcomed the members, and hoped their deliberations would be interesting and instructive, and would result in good to the general public.

Mr. J. H. CANNING (Newport) thanked the Chairman of the Council, on behalf of the Institution, for his cordial welcome. He said that, under the able direction of the Council and their officials, he had not the slightest doubt that the town would see great developments in the future. They would all endorse the very high terms of appreciation in which the Chairman had spoken of their new President, Mr. Mogford. The honour that the Institution had conferred upon him was well deserved. They had all known him for years, and realized his ability; and he was sure that he would do credit to the Institution during his term of office, and have a most successful year.

CONFIRMATION OF THE MINUTES.

The HON. SECRETARY (Mr. Octavius Thomas, of Pentre) read the minutes of the previous meeting, and they were confirmed.

NEW STUDENT.

Mr. Fernand Dupont, Articled Pupil at the Neath Gas-Works, was elected a student of the Institution.

THE RETIRING AND NEW PRESIDENTS.

Mr. KENSOLE said that, before asking the new President (Mr. Mogford) to take the chair, he would like to thank the members for the courtesy they had invariably shown him during the past year, and for the good attendances there had been at the meetings. It had been a source of great pleasure to him, as it must be to any President, to see the meetings well attended. He would also like to thank their friend Mr. Octavius Thomas for the work he had done as Hon. Secretary during the year. He would now call upon Mr. Mogford to take up his office.

Mr. J. MOGFORD (Briton Ferry) then took the chair, amid applause, and thanked the members for their cordial reception. He then proposed a hearty vote of thanks to Mr. Kensole for the able manner in which he had carried out the duties during the eighteen months he had occupied the chair. Mr. Kenshole had, he said, from the commencement taken the very keenest interest in the business of the Institution; and although they had been passing through extremely troublous times, he had conducted the proceedings in a manner which reflected the highest credit on himself and would be of lasting benefit to the industry of the district. Both individually and collectively they were indebted to him for the information he had given in his address with regard to rating and taxation, and for the unremitting attention he had given to the Institution's affairs.

Mr. H. D. MADDEN (Cardiff), in seconding, said Mr. Kenshole had been a genial and unruffled President during a time when occupying the chair had been very much harder than before. Every year brought increasing duties and greater anxieties to the President of a District Association; and Mr. Kenshole had worked extremely hard, not only for their own Institution, but for the industry at large.

Mr. KENSHOLE, in acknowledging the vote, said that what he had done had been a labour of love, and he hoped it had been of some advantage to the Institution. It certainly had been of considerable benefit to himself. Eighteen months ago, when he took up the position because of the absence of their then President, Mr. A. W. Branson, he hoped very sincerely that during his term of office this terrible war would have terminated. This hope had not been fulfilled; but he trusted it would be before Mr. Mogford vacated the chair.

Mr. MOGFORD then delivered the following

PRESIDENTIAL ADDRESS.

Gentlemen,—I thank you for the honour you have conferred upon me in electing me your President, and trust that, with your assistance, I shall maintain the interest and the usefulness of the Institution during my year of office. The Institution has maintained a steady growth. It has more than fulfilled the hopes of its founders; and the benefits of intercourse and co-operation which it affords its members have been advantageous in the past, and should prove of inestimable value in the immediate future.

The war, which seems destined to embroil all nations upon earth, has brought to the gas industry serious difficulties and responsibilities; and those who serve the industry may justly feel proud that the difficulties have been overcome in a manner which merits the compliment paid to them by Lord Moulton through the Institution of Gas Engineers.

For more than a century gas manufacturers have trodden an uneventful way—pursuing their art in accordance with the plans of Murdoch, Clegg, Croll, and Barlow; carrying out their statutory obligations, within their statutory areas; and paying their statutory dividends. Original research and the treading of new ways have been left to the "other fellow," with the result, as we now find, that we have gone so far as to provide our greatest enemy with the chief requirements for waging war upon us.

The fall of the year 1914 brought its rude awakening; and England is to be felicitated that she still possessed, in the gas industry, the men and the means that could produce the explosives that enabled her armies to drive the enemy from the Marne to the Aisne, and can, if need be, provide sufficient for them to blast their way from the Aisne to the Rhine.

THE NEED FOR RELIEF.

Gas engineers have not been accustomed to "shouting from the house tops;" but the time has come when what Lord Moulton designates as "not only one of the most important industrial bodies in the country, but one which has to face a great practical work on which almost the existence of our present civilization rests," should, in the interests of the undertakings they control, do as his Lordship thinks they are entitled to do: "Point out to the world how much, and in what way, the country is indebted to the industry for its safety in this war."

An industry whose operations are essential for the defence of the realm, and whose products are equally as important in times of peace, must of necessity be a valuable national asset; and as such its operations and interests, financial and technical, should be jealously guarded, and its factories maintained in a condition that would enable them to meet all demands upon them. From perusal of the technical journals it is patent that such efficiency is not now being maintained, and that the proprietors of many undertakings have to contend with serious financial difficulties. It should be the business of the National Gas Council, as custodians of the interests of the industry, to obtain some measure of relief for such cases. By so doing they would possibly avert contingencies that might cripple the undertakings for a decade. The position is one which will not be improved by delay.

Parliament has fixed the prices of gas and sulphate of ammonia. Tar, the product essential to the saving of the nation and civilization, has dropped about 10s. per ton from the pre-war price. Dividends are reduced; and the market value of shares has in many cases almost reached bankruptcy levels. All extensions are stopped for want of capital. Repairs are postponed owing to high prices; and reserves are being depleted for maintenance

purposes. Wages have increased. Coal, in South Wales, has gone up by 50 p.ct.; and its quality can hardly be said to have improved.

Where the prices fixed by Parliament are such as to preclude the payment of a fair dividend in present circumstances, it is not unreasonable to ask that prices should be revised. If a concern has to increase its prices, in such a manner as would tend to reduce its efficiency from a national standpoint, financial relief should be granted in some form. In many instances, suppliers of our raw materials are paying excess profit tax. Might it not be feasible that such material could be supplied to gas-works at a lower price? The prices paid to works for products of national importance should also be reviewed. The time has come when the leaders of the industry should urge upon Government Departments the desirability of gas-works being kept in a condition that will enable them to supply the demands of war time, and the necessity for preparing such an indispensable industry for the leading place that it must take in the commercial reconstruction of the nation.

CASE OF THE EMPLOYEES.

Your Commercial Section has had under consideration the wages paid by gas undertakings. Lists of wages have been collected and tabulated; but circumstances prevent the matter being carried further for the present. Wages in different districts will differ in accordance with local circumstances; but uniformity in particular areas would tend to minimize unrest among employees. In every case, the remuneration should be such as would compare favourably with that paid for similar work by other industries in the respective districts, so as to attract the best kind of workmen to gas-works.

There are in England and Wales some 800 gas-works with an annual output of 50 millions or under; and 600 of these supply less than 20 millions of gas a year. The control of these works (which form a numerical majority) is a matter of considerable importance to the gas industry. The proprietors of the works cannot expect a rush of graduates in engineering for the chief appointments on their undertakings; neither would the positions prove attractive to the specialists of the larger works. The appointments must, therefore, continue to be filled by the more ambitious in the ranks of small and medium-sized works; and the manning of such ranks with the best available units would result in the betterment of small concerns and of the industry.

TECHNICAL EDUCATION.

The parent Institution has for some years given considerable attention to the importance of technical education and original research. There is just now afoot in South Wales a strong movement for the advancement of technical education and original research in connection with the different industries. The Commercial Section of this Institution has promised to support the scheme; and, in the interests of the industry, each member should ask the proprietors of the undertaking with which he is connected to give the matter sympathetic consideration.

I understand that the immediate proposal is to augment the facilities now available for the work in question at Cardiff and Swansea. Swansea has, for many years, maintained a Technical School, which has been well patronized by the employees of the local industries. The engineering and the metallurgical courses include subjects allied to gas manufacture; and there can be no reason why the coming reorganization should not include facilities for intending gas engineers, or at least prepare students for the scholarships of the gas industry at Leeds.

EARLY WORK IN SOUTH WALES.

The scheme is one which for another reason should commend itself to this Institution. The text-books of our art tell us of the struggles and ingenuity of Murdoch, Clegg, Croll, and others; but apart from the tribute paid to Dr. Watson, Bishop of Llandaff, there is no mention of the work done in South Wales during the infancy of the industry. While yielding to no one in my homage to Murdoch and his compeers, I claim that it is my pleasure to have invited you to-day to a district that must have been at least one of the cradles of the gas industry. I must confess to a certain amount of pride in the exhibit to which I invite your attention at the close of the meeting. It consists of plans, detail drawings, and rough sketches of some of the first gas plant ever erected, and is documentary evidence that as much work was done by local engineers in the twenties of last century as was executed by Messrs. Boulton and Watt.

It therefore behoves you as the present-day representatives of these Welsh pioneers to use your influence in the advancement of technical education, and thus maintain the district in the leading place it occupied in the early days of gas manufacture.

Incidentally, I would draw your attention to the fact that intermittent vertical retorts and a few other modern devices were not unknown one hundred years ago.

CO-OPERATIVE TAR DISTILLATION AND SULPHATE MANUFACTURE.

Your Commercial Section has had under consideration a proposal for the working of co-operative tar distilleries; and the matter has been referred to the National Gas Council. The prices which small works receive for their tar indicate that some arrangement of the kind is necessary. A similar arrangement for dealing with ammoniacal liquor would be advantageous, if applied to groups of small works. It would help to relieve the railways, and convert the considerable quantities of ammonia which now go to waste into a much-needed fertilizer. A simple means for the direct manufacture of sulphate of ammonia would, if it could be adopted without purifying troubles, prove a boon to small gas-works. I have often wondered why the direct method patented by Croll, and used by him at several gas-works, was discarded.

GAS *v.* ELECTRICITY.

The question of the competition between gas and electricity is one which you have discussed on many occasions. It is well in the interests of both supplies that a spirit of rivalry should be maintained; but there are limits within which such rivalry should be confined. Personally, I confess to being a firm adherent to the opinions expressed by the late Mr. J. G. Newbigging in his address to the Manchester Institution in the year 1914. The two commodities are applicable to precisely the same uses; both are indispensable to the comfort and well-being of the community; and, for national economy and the welfare of the general public, the users of both commodities should be able to obtain sound impartial advice as to which is best-suited to their particular requirements. We are urged, for national reasons, to economize in every direction; and one cannot but agree with Mr. Newbigging that "the avoidance of rash and unfair competition would result in the saving of large sums of money, make for better efficiency, and give greater satisfaction to the public whom we serve."

The proposed linking-up of electrical undertakings, and its probable effect upon the gas industry, are matters which should command the attention of every gas engineer. The technical journals of the industry have, on more than one occasion, dealt with the subject in language which lacks nothing in emphasis. The present proposals of the electrical industry may not have a serious effect on the largest gas-works; but medium-sized concerns will find that the resultant economies in electrical supply will accentuate the already keen competition, and smaller undertakings, wherever the high-tension connecting lines touch or pass through their districts, may be faced with competition which might prove disastrous.

Provision of a cheap supply of light and fuel will be of such importance in the coming commercial renaissance that Government Departments will be compelled to bring into prominence the question of gas and electricity supply; and the welfare of the gas industry demands that immediate attention be given to the admonitions of its technical press. In any case, the interests of the industry should be protected by the formation of District Committees for discussing the subject on the lines adopted by the electrical industry.

Nine years ago I ventured to place before you a suggestion for the inter-connection of gas-works in this district. Many parts of the area have since been lit electrically, and are lost to the gas industry. These installations will presently be incorporated in the larger scheme and linked-up to control generating stations. In order to obtain a clear conception of the benefits to be derived from a linking-up scheme in this locality, a short description of the district and its industries will be of assistance.

Geographically, West Glamorgan may roughly be described as a series of valleys converging on Swansea Bay. The district has for centuries been known as a metallurgical centre; the chief industries being the production of copper, silver, spelter, and iron, together with the manufacture of steel, tinplate, with all the subsidiary engineering shops and factories. Coal underlies the whole area—the northern part producing anthracite, and the southern a more or less bituminous variety of coal.

The proposal of the electrical industry, as I understand it, is to link-up the existing generating stations at Llanelly, Swansea, and Neath, and to subsequently connect-up the valleys. Note is being taken of the large steam-engines which are used in the district as prime movers for mills, &c., and also of the comparatively large electrical generating stations at collieries and works throughout the area. A feature which is of more interest to the gas engineer is that the smelting works consume large quantities of metallurgical coke, considerable amounts of which are produced in beehive and other non-recovery ovens. These ovens are now being replaced by modern ovens fitted with recovery plant. Huge quantities of bituminous coal are gasified for heating steel and other furnaces, and many thousands of tons per annum are used for heating and annealing purposes in tin plate factories. The total quantity of coal used, the bye-products from which are lost, must be immense. This combination of circumstances is interesting from the lighting, heating, and power point of view. It should commend itself to the British Association Fuel Economy Committee, and also to the Fuel Research Board, in connection with their investigation as to the most suitable gas for general use.

The Lancashire and Cheshire report on the linking-up of electrical undertakings says: "The time has passed when power to generate electricity, which is so vital to the interests of the trade of the nation and to the efficient employment of the nation's principal source of wealth—coal—should still continue to be exercised solely for the purpose of supply within a limited area; and, in order to deal efficiently with the future requirements, they consider it essential that extensions of existing stations or the provision of new plant should only be proceeded with after due consideration has been given, not only to the requirements of the particular area in which such stations may be situated, but also to the actual or potential requirements of the surrounding districts. In other words, the provision of efficient generating plant has ceased to be a matter which only concerns each separate undertaking as it is at present constituted, but has become an

important element in the welfare of whole districts, without regard to municipal or other boundaries."

This paragraph is equally applicable to gas supply; but I would go further, and say that the time has fully come when the supply of light, heat, and power to an industrial district should, in the interest of the trade of the nation, be obtained by the destructive distillation of coal, the recovery of its valuable bye-products, the complete gasification of such of the residue as is not required for metallurgical purposes, the distribution of gas of such composition as investigation shall prove to be most suitable for general purposes, and the distribution of electricity generated by means of internal combustion engines.

A Vote of Thanks.

Mr. KENSHOLE, on the conclusion of the address, proposed a hearty vote of thanks to the President. He said he had been very gratified at the contents of the address, because they indicated a prosperous year with Mr. Mogford in the chair. While they had members to take the chair and prepare addresses of this description, they might be sure the Institution would continue to flourish.

Mr. J. H. CANNING (Newport), in seconding the vote, remarked that the President had covered a wide field, and had pointed out to a great extent the path that must be followed in the development of the industry, if they were to maintain their ground. There was one matter he would like to emphasize, and that was the hope which had been expressed that the Government might see their way to assist gas undertakings in a more substantial manner to bear the burdens they had undertaken in the national interests. He knew there were a great many claims at present on the Government for assistance in one way or another. But the gas industry had performed services to the country the magnitude of which could not be exaggerated; and, largely as a consequence of the altered condition of affairs which the Government had been obliged to bring about for the national good, the industry had been subjected to considerable hardships and difficulties. He did hope the various bodies representing the gas industry—including their local Institution—would do what they could to press the Government, in order that they might obtain a little better support in the future than they had had in the past.

The vote was then cordially passed, and duly acknowledged by the PRESIDENT.

Report of the Special Purposes Section.

There was then submitted the seventh annual report of the Special Purposes Section. This stated that one local authority and four gas companies had joined the section during the past year, making a total membership of 29. These members carbonized 85 p.ct. of the coal in the South Wales area. Six meetings had been held during the year, at which various matters had been discussed. It was pointed out that it was advisable to push the local consumption of coke as much as possible, because, owing to the shortage of railway wagons and steamers, it would be difficult to dispose of the increased make during the coming winter. A conference of Commercial Sections was held in Birmingham last October, with the object of arranging depôts on main roads in the United Kingdom for the supply of coke to vehicles at present equipped to use coal or alternately coke fuel only. Vehicles using coke were largely on the increase, and depôts had been arranged with marked success in the neighbourhood of London. After circularizing the whole of the gas-works in the Wales area, a list was sent to the Commercial Motor Users' Association indicating places where coke could be obtained. This would be published in the next issue of their guide-book. Considerable attention was given to the low price received for tar. At the request of the National Gas Council, two members were appointed to represent the section on the Committee selected to consider the financial hardships that gas undertakings have suffered through the war, and to decide the best method of relieving such cases. The Committee were satisfied with the work done during the year; and much more could have been done if more funds had been available.

Mr. T. H. HAZELL (Newport) thought that a study of the seventh annual report of the Special Purposes Section would reveal the extent of the work that had been done. It was a satisfaction to find that some of the undertakings previously outside the section had now become alive to the value of connection with it. One could only hope that the time was not far distant when it would be looked upon as one of the first duties of a gas undertaking to associate itself with the work performed by the section. Reference was made in the report to the supply of coke to vehicles. Those who were present at the Merthyr meeting of the Institution would remember that a useful paper was then read by Mr. W. C. Jackson, of Neath, urging the use of coke for motor lorries. It seemed as if those who were using lorries were taking the matter into their own hands, and that gas was going to be used more than was at one time expected as a driving power for heavy vehicles. He did not know whether much encouragement had been given to this movement by the gas industry; but practical men who used the vehicles had discovered the value of it, and were looking to gas undertakings as a means of helping them out of the difficulties in which they found themselves at the present time. The only other point in the report which he need touch upon was that relating to financial hardships. There was no doubt that, owing to the demands made upon the industry by the Government, in connection with work necessary for the carrying on of the war, considerable difficulties had been imposed upon gas undertakings. Now, no industry could make bricks without straw; and when it came to imposing upon an industry the outlay of large sums for the purpose of erecting special and additional plant, and then later on practically scrapping the whole of the plant—those who were in the industry would know exactly what he meant—it was time that some consideration was given by the Government to the position of affairs. The war had caused their industry to suffer very severely. In some cases they heard of companies and authorities getting through with a small addition to their price and a satisfactory balance-sheet; but there was scarcely to be found a gas undertaking in the country that had not suffered in one way or another, and it certainly was a time when they ought to be able to look with confidence to the new Council that had been created in the interests of the industry to take action, and take it quickly. There was some remote idea of dealing with it after the war was over. But public authorities had short memories; and if the matter was to be dealt with at all, he thought they would agree that it should be done when "the shoe pinched." ["Hear, hear."] They were told in the report that the accounts were satisfactory, and that the Treasurer possessed the magnificent balance of 7s. 9d.; but he would strongly direct the attention of those undertakings that were not at the present time associated with the Commercial Section to the statement that the work had been done satisfactorily, and much more could have been done if funds had been available. Certainly the section could do more good if it had the support of every undertaking in the district. He moved the adoption of the report.

Mr. E. H. SWAIN (Pontypridd), in seconding, agreed that the membership of the section could do with a little recruiting. Speaking for himself, he never attended a meeting of the section without profiting in some way. He was specially glad to see the interest taken in the matter of financial hardships. They had been very badly hit; and, in season and out of season, it would seem that the section and the Institution must press on the National Gas Council to bring to the attention of the Government the many hardships under which gas undertakings laboured, and for which they wanted relief.

The report was then adopted.

Representative on the Council of the Institution of Gas Engineers.

On the proposition of the PRESIDENT, seconded by Mr. R. A. BROWNING (Neath), it was agreed that Mr. J. E. Kenshole should be the representative of the Institution on the Council of the Institution of Gas Engineers for the year commencing in June, 1918.

Promoting Gas Sales.

Mr. W. H. CATTELL, Chief Salesman of the Swansea Gas Light Company, then read a paper entitled "Promoting Gas Sales," which, with a report of the discussion, will be found on pp. 560-63.

The District Council Thanked.

Proposed by Mr. CLARRY, the Chairman and members of the Briton Ferry Urban District Council were thanked for allowing the use of the Council Chamber for the meeting.

Place of Next Meeting.

It was decided that the place of next meeting should be left to the Council to decide.

Subsequent Proceedings.

The meeting over, the members and friends proceeded to the Royal Dock Hotel, where they were guests of Mr. Mogford at luncheon. After the Loyal Toast, Alderman Canning proposed "The Chairman and Members of the Urban District Council of Briton Ferry;" remarking that they had in their hands not only the gas-works, but also the electric light and water supply, among other things; and all these undertakings were well carried on. More than this, they had shown themselves capable of dealing with a problem which many other Councils were afraid almost to attack. He referred to the housing problem. With the toast, he coupled the name of Councillor Joseph Branch, who (in the enforced absence of the Chairman) replied, and declared that he felt proud of all the kind things that had been said of the Council. They were proud to have the Institution visit their town; and they were prouder still to feel that the visit was in connection with the election of one of their officers as President. They all thought very highly of their officials, who were not behind those of any other town in the United Kingdom. As to the gas undertaking, during Mr. Mogford's management the consumption had increased to five times what it was when he came. Besides, he had carried out many improvements which had given great satisfaction to every member of the Council. Councillor Watts proposed "The Wales and Monmouthshire District Institution of Gas Engineers and Managers," remarking that if the Institution got out of Mr. Mogford as President what the Council had had as Gas Engineer, they would have no cause to regret their choice. Works which were in a derelict condition twenty years ago had, through his foresight and perseverance, become model works for their size. He wished the Institution every success in their great work. Mr. Mogford, in response, said, prior to the formation of the Institution, managers in the district had no means of intercourse. Each was buried away in his own works, with no one interested in him, and the man in the street caring nothing as long as the gas supply was maintained. This had since been changed; and he would like to say a word in appreciation of the manner in which the engineers of the larger works in South Wales had interested themselves in the Institution, and the brotherly—or he might say fatherly—manner in which they had met those in control of the smaller works. The gas industry was never more necessary to the welfare of the nation than to-day. It had on several occasions been "condemned to death." In the early time of electrical engineering, it was thought that the days of the gas industry were numbered; but it was then given a new lease of life. To-day it was being re-vitalized by the Germans in another manner. It was found that, by sending them the products of tar, they were providing them with the means of making dyes. The manufacture of dyes was akin to the manufacture of explosives; and for some time before war was declared the Germans were undoubtedly using what was sent for the purpose of manufacturing war material for use against this country. England would see that in future she was independent of foreign made dyes and explosives, and that the gas industry was maintained, as it must needs be in the national interest, as one of the most important industries in the land.

The afternoon was enjoyably spent between the gas-works and

several factories where interesting processes are in operation. These were the Briton Ferry Iron-Works, where were seen blast-furnaces making the pig iron from the ore; the works of the Briton Ferry Steel Company, where shell steel was being made; and Messrs. Taylor and Sons, where they were turning out the shells. By the last-named firm, tea was kindly provided. After the whole process of shell manufacture (as far as it is carried at the works) had been explained by the proprietors, speeches were made by Mr. H. A. Clarke (Surveyor to the Council), Mr. Jones (Captain of the Fire Brigade), Mr. W. Cleaver (Engineer to the Port Talbot Docks and Railways), and others.

THE GAS-WORKS.

As to the gas-works themselves, there is not a great deal to be said. When Mr. Mogford went to Briton Ferry twenty years ago, he found himself faced with the familiar uphill fight of a small works over-capitalized, which had been allowed to get into a bad state, and was losing about £800 a year.

At that time—in 1897—the number of consumers was 250, and the make of gas 8 million c.ft. per annum. This was a state of affairs which he immediately set about to alter. For one thing, he introduced free installations, and arranged exhibitions and demonstrations. By this and other means, the number of consumers was rapidly increased, until at the present time there are about 450 ordinary and 1200 prepayment; the gas output last year being between 38 and 39 million c.ft. This year it will certainly be from 3 to 4 million c.ft. more; for in the past two months there has been an increase of over a million c.ft.—due, of course, to the munition work being carried on in the district.

The price of gas twenty years ago was 3s. 9d. per 1000 c.ft.; and now it is being sold at 3s. 2d. to 3s. 6d., with 8d. extra for prepayment meters. These were the pre-war charges; and they have not been increased. It has been necessary to use up the reserve for extensions since the war; but Mr. Mogford is hopeful of being able to avoid raising the price of gas, because some of the loans have been paid off, which will relieve the undertaking of a charge of about £600 a year. The works have been from time to time added to, in order to meet the growing demand; for now practically every house has a supply of gas.

A railway siding into the works has been arranged for; but at present it is as cheap to cart the coal, which is brought in and dumped in the retort-house at a cost of 6d. per ton. There are four beds of six retorts, with shallow generators; and the make has in the twenty years gone up from 9000 to 11,500 c.ft. per ton of through local coal. The exhausters are not direct-coupled, but driven by a gas-engine off shafting, which is also used to drive the rotary scrubber and all the pumps. This has been the method adopted for many years; and with this drive, and the retort-house governor, no difficulty is ever experienced. As a stand-by, an electric motor is provided; and in the same house there is another gas-engine which is used for running a mortar mill. All the pan breeze produced is utilized for mortar for the Council and anybody else who requires it. Of the two holders, one (by Messrs. W. C. Holmes & Co.) is spiral-guided, and contains 280,000 c.ft.; while the capacity of the other is 75,000 c.ft.

High-pressure gas is not supplied by the undertaking; but some of the customers have their own compressors. In connection with distribution, one other point is worth noting. The Council have a main running out to supply the navigation lights for the harbour at the mouth of the river; and at high water the farthest light is over two miles at sea. The main, which is a 2 in. and 3 in. cast-iron one, is laid in blue clay; and during the thirty years it has been in position, it has given scarcely any trouble. The only two occasions Mr. Mogford can recall are one when the bank in which the pipe is buried slipped into the bed of the river, and another when the propeller of a steamer passing over the top nipped the standpipe of the syphon. He naturally regards this as a good instance of the longivity of mains in difficult positions.

SOUTH WALES AND EARLY GAS PLANT.

It will have been noted that, in the course of his address, the President referred to the important part played by South Wales in the provision of manufacturing plant in the very early days of the gas industry. Attached to the walls of the Council Chamber during the meeting were a number of plans, signed and dated, which amply bore out his claim; and it is to be hoped that the members found time to carefully examine them. But it should be said that these constituted only a small proportion of the documentary evidence in Mr. Mogford's possession. There are in his office innumerable plans, specifications, &c., of gas-plant work carried out in the early (and later) years of last century at the works of the Neath Abbey Iron Company, which also had much to do with early steam-engines, and things of that kind; and many of them are of peculiar interest, apart from their use as evidence on the particular point which Mr. Mogford was making in his address.

To mention only a very few, there are plans for complete gas-works at Carmarthen, dated 1822; Havod Rolling Mill, 1820; their own Abbey Works, 1820; and Youghal, 1830. There is a vertical retort designed for Pontardawe in 1839; while in the case of the Havod Rolling Mill the retorts are in the open, and the only other plant shown is a wet lime purifier and a holder. The retorts for Carmarthen were kidney shaped; and for Neath there was designed an oval gasholder (dated 1842), which, however, seems never to have been built. The vertical retort drawing, which is signed "E. O. and M. Manby," shows what may have been intended as an arrangement for steaming. Many of the plans, &c., bear the name of "E. O. Tregellis." The first plans for Carmarthen show a gasholder house; but there is no evidence as to whether it was ever built. In an old book there is, too, a sketch of a retort for distilling tar. A few of the other plans noticed related to work at Aberdare, Ashburton, Barnstaple, Bridport, Colchester, Dover, Exeter, Falmouth, Galway, Haverfordwest, Llanelly, Ross, Saffron Walden, Swansea, Tralee, Usk, Wellington, Witham, Yeovil.

Mr. Mogford's interest in the Neath Abbey Works arises to some extent from the fact that his grandfather was engaged there. The descendants of many of the other people who worked there are still in the district. Sir Benjamin Baker was apprenticed at these works.

PROMOTING GAS SALES.

By W. H. CATTELL, of Swansea.

[A Paper read before the Wales and Monmouthshire Association, Sept. 19.]

The systematic development of gas sales is a subject which should be of more than passing interest to every gas manager. Much has already been said and written on the subject of show-rooms; but I feel certain it is only the most receptive minds and the better equipped companies which have benefited. Many gas-works are still without the selling agency and advertising effect of a showroom. To managers to whom this applies, I would urge a reconsideration of the matter at the earliest possible moment.

It is a truism that anything which is necessary for the proper and good conduct of a business is paid for, directly or indirectly, whether purchased or not. Applied to the subject under consideration, this means that if the provision of a suitable showroom would help the sales of gas in your district, by continuing without one you are losing.

SELECTION OF A SHOW-ROOM.

I presume we are all agreed that the provision of a showroom is a modern necessity in connection with every gas-works. Probably those engineers who have not yet equipped their undertakings in this direction are the victims of circumstances over which they have no control. Admitting the desirability of a showroom, I will call attention to a few points to be observed in the selection of suitable premises and equipment.

1. The gas-works are rarely (if ever) situated in the main shopping thoroughfare of a town; and it meets the convenience of gas consumers to have conveniently arranged central offices for transacting all ordinary consumers' business.
2. The provision of a central office, at which consumers may be requested to pay their accounts, enables the management to display in the same room or rooms gas apparatus which will appeal to all users or prospective users of gas.

I take it that the real function of a showroom (apart from the receiving of accounts) is: First, to show gas-consuming appliances of suitable design in suitable surroundings, and wherever possible under working conditions, with the object of creating in callers a "desire to possess," as undoubtedly the creation of this desire is the essential feature whether one is attempting to sell by advertisement or by ocular demonstration; secondly, having interested your prospective customer, to sell to him such apparatus as may be most suitable for his particular requirements, remembering that the whole transaction—including the sale of the apparatus, the fixing, the working of the apparatus when fixed, and the subsequent gas consumption—must all be to the consumer's satisfaction. Mere turnover and profits on appliances sold are not the goal to which selling staffs should strive.

REQUIREMENTS OF A SHOW-ROOM.

Commencing a brief review of a showroom from outside the premises, one should remember that the paintwork and general appearance should be that of a smartly conducted business, and that the windows are a most important item. Windows provide the cheapest and most attractive method of calling the attention, not only of callers but of all passers by, to the advantages of using gas for some purpose or other. The dressing of the windows should not be done in a careless and perfunctory manner. Do not make the place look like a third-rate ironmonger's shop or an extra storeroom for odds and ends. Effective and distinctive displays should be aimed at.

A striking illustration of an interesting and attractive window display is the bye-product scheme conceived and carried out by my chief, Mr. Reginald Clarry, which was described in the British Commercial Gas Association's "Bulletin" for December, 1916. The chief feature of the scheme was a number of sample bottles of the bye-products of the gasification of coal. These bottles were grouped in the showroom window with a framed card in front of each, as, for example: "*Benzol.*—A motor spirit of greater power and efficiency than petrol. Used in the manufacture of high explosives and aniline dyes." At the back of the rows of bottles, boxes of various sizes of coke and breeze were shown. The good offices of the local Press were also called into service; and a number of articles on coal conservation appeared, in which public

attention was directed towards the display by the gas company. The comparison of the scientific and organized method of coal usage as against the crude and wasteful method, which was demonstrated with a heap of soot, greatly interested a number of local business men, who are normally not reached by the ordinary type of advertising. Local teachers were greatly interested, as were others, many of whom were from far-distant towns. Photographs of the display were supplied on application.

It is worthy of note that the bye-product display was inaugurated in June, 1916, in anticipation of the Government and general public interest now taken in the principles involved. Following on this display, the same central notice was maintained, and the old-fashioned and wasteful methods of heating were compared with modern gas heating and lighting equipment. This was followed by a similar comparison between an all-gas kitchen and a kitchen range heated directly by coal. More recently, we have fitted up one of the windows as a bathroom, with a geyser pouring hot water into a smart-looking bath. A white enamelled chair and a bath-mat, with a suitable scheme of decoration, give the finishing touches to the display.

In arranging any window show, exhibit plainly the price for which your consumer may have a duplicate fixed complete in his own premises.

On entering a showroom it is desirable that one should be impressed with the attractiveness of gas for all its demonstrated uses. Gas-fires should be shown fitted up against attractive mantelpieces, and with suitable furniture in close proximity. Cosy fireplaces, with nice curbs and hearthrugs and comfortable chairs, are a never-ending attraction. Have the price "fixed complete" shown against each, and be prepared to sell the mantelpieces and tile surrounds and hearths if required. Avoid ugly fitting work, by making gas connections very neatly. Where possible, show no pipes—bring the supply up under the fender of the gas-fire. At least one gas cooker should be fixed up in surroundings looking as homely as possible; and avoid placing fires, geysers, grillers, and sundries all round it. A bathroom fully equipped with a geyser, bath, hand-basin, and the usual bathroom conveniences, will be useful in attracting the attention of all who experience difficulty in obtaining hot water at will. The lighting goods should be all live points, ready for immediate lighting. Clean, up-to-date fittings should be shown—suitable globes, shades, and lamps being fixed in the various positions to demonstrate their particular uses.

One could say much of the weaknesses of many showrooms; but to do so would be to repeat the excellent notes of Mr. Cyril G. Davis, published in the "GAS JOURNAL" for Nov. 2, 1915. I would urge all gas managers to re-read this article, which has since been issued in pamphlet form.

Care should be taken in the selection and purchase of all apparatus for sale in the showroom. Only the best of everything is good enough. Avoid irritating complaints of overcharges afterwards, by quoting a price "fixed complete." It is quite a by-word that a householder does not know how much it will cost him each time he calls a plumber into his house. This can be avoided by getting a signed order, stating the price to be paid before putting the work in hand.

FIXING FITTINGS, &c.

Having secured orders for apparatus, the fixing into position upon the consumer's premises should be carried out promptly by experienced fitters working under efficient supervision. Remember that the class of goods you sell, the way the fixing is carried out, and the impression given to a consumer, will result in your obtaining a reputation for good, for bad, or for indifferent work. A reputation for bad or indifferent work will take years of good work to live-down, whereas a reputation for good work is a standing advertisement and a certain indication of an increasing business.

Do not imagine that advertising is unnecessary. If you can possibly handle more business, the quickest way to obtain it is to advertise. Judicious advertising pays, and pays well—although sometimes one cannot see the results directly.

Never look upon each order as a completed transaction. Let your next order in any premises be the beginning of a series of such orders—not being content until the gas installation is quite complete, and the consumer satisfied with the careful and courteous attention he has received, and satisfied with the clean, convenient, and economical labour-saving appliances you have installed. The satisfied consumer is the best advertisement.

Managers who have well-appointed showrooms under their control will agree with me that such an establishment is a great asset in the conducting and in the prosperity of the undertaking, and by no means the white elephant it is supposed by a few to be. In addition to being a permanent advertisement for the proper use of gas and a convenience to all concerned, a well-managed showroom can be made to pay all its expenses, and possibly to yield a small profit.

TESTING COOKERS.

Apropos of my remarks *re* advertising, you have all seen the advertisements of the "Super-Multicooker," which is now being prominently pushed. In pursuance of the Swansea Gas Company's policy of obtaining information from practical trials and demonstrations for the guidance of their consumers, tests were made at my private house under my personal supervision, on behalf of the Company. I have much pleasure in submitting the following figures for your consideration, and only have to regret being unable to confirm the economies claimed for this cooker.

	July 28, Standard Make High-Class Cooker.	Aug. 25. Super-Multicooker.
Joint (leg of lamb)	3 lbs. 10 ozs.	3 lbs. 7 oz.
Vegetables—		
French beans, 2 pts. water .	¾ lb.	¾ lb.
Potatoes, 1½ pts. water . .	¾ lb.	¾ lb.
Time taken to cook	1 hour.	1 hr. 35 min.
Gas consumed	27½ c.ft.	40 c.ft,
Pressure of gas	27-10ths governed	*Increased to 45-10ths.

We are still carrying out tests on various types of cooking devices, with the desire to be personally and fully acquainted with the merits or otherwise of the different types, as compared with a standard make of high-class cooker. The advent of a much more efficient type of cooking stove has not yet come to my notice, although, in common with all who have the best interests of gas sales at heart, we in Swansea are eagerly looking for still more economical and efficient types of apparatus to place before our customers. All keen gas managers now recognize that the consumers' interests are also the interests of the gas companies, and that "Efficiency and Economy for the Gas Consumer" is the best policy to adopt.

DISCUSSION.

The PRESIDENT (Mr. J. Mogford, of Briton Ferry) said they were indebted to Mr. Cattell for the trouble he had taken in the preparation of his paper, which should give rise to a good discussion.

Mr. EVAN REES (Margam) remarked that the paper they had had the pleasure of listening to was an interesting one, and one of particular importance to every member, inasmuch as it contained hints of considerable value on the subject of the further utilization of coal gas. In the case of small works, with an output of from 50 to 60 million c.ft., a show-room was a decided advantage. In such a show-room as the author had pointed out, it was necessary to have the best types of appliances on view, so that both prospective and existing consumers might have demonstrated to them the undoubted benefits of gaseous fuel for domestic work generally. But, of course, the smaller undertakings could not go to the extent of the larger ones in the provision of the well-appointed establishments that were to be seen at Newport, Cardiff, and Swansea. The exterior was, however, often of less importance than the interior, so far as the smaller undertakings were concerned. As he had said, the appliances should be the best of their kind, and fixed in such a manner that the public could see just what they could have in their own homes. There still remained a very large field for the further development of gaseous heating. Personally, he believed that in the industrial towns of South Wales the public were ready to adopt this form of fuel. They were alive to the fact that the use of coal in an open grate was wasteful and dirty; and they consequently felt that they should develop in their own homes better methods—and certainly labour-saving devices. He thought the gas industry should do everything possible to help on matters by endeavouring to show the public, at all times and at all seasons, the advantages of the utilization of gaseous fuel in the best types of appliances. The interest of the gas consumer and the gas supplier was a mutual one. What was being done at present was only a tithe of what could be accomplished. It had been his pleasure at Port Talbot to fit up some villas which were entirely heated and lighted by gas, without a coal-fire at all. There were five of these houses; and they were anticipating further developments when the building boom came along. A domestic supply of hot water was provided as well; and the experience of the users was entirely satisfactory, because they could get hot water at any moment of the day or night, without any trouble whatever. The consumers were convinced of the economy of these installations as compared with coal; but it was necessary to point out that the question must be looked at all round. What the public should have was labour-saving facility; and the gas undertakings were in a position to provide this. Therefore it was up to the industry to do what could be done; and the hints and advice contained in the paper could be taken to heart with profit.

Mr. H. D. MADDEN (Cardiff) expressed the opinion that Mr. Cattell and his chief, Mr. R. G. Clarry, were to be congratulated upon the manner in which they had tackled the show-room problem in Swansea. What they had provided was quite up to date, and even in advance of the times. The paper was very opportune at the present juncture. It might be said that under war conditions there was a difficulty in obtaining materials for gas-fitting work; but, on the other hand, they had another consideration before them, and this was what the public wanted. The public, with this terrible war on, were faced with a problem which was having a great influence on the sales of gas, and this was the shortage of domestic servants. There was, he thought, no town or village in the country where it could be said that there was an ample supply of domestics. Certainly, it was not so in South Wales. Therefore, the public were going to look round for something that would relieve the household work; and gas was the only means of doing this—gas cookers, fires, irons, water-heaters, and appliances of this description. It seemed to him that the more the gas undertakings fixed of these, the better would be the service they were doing for the country. Of course, the most efficient fittings must be provided; but there was another word which the author seemed to have omitted. The appliances should be of a simple type. He felt that if gas was going to be used to the extent in the near future that every sign indicated it would be, simplicity and standardization would become very important considerations. A simple appliance that the consumer thoroughly understood would give much greater efficiency and much more satisfaction. There was one point he would like to mention, because he thought it was a subject that followed on what he had said as to the increased use of gas. This was the relationship between the show-room and the fitting department, in connection with the carcassing of houses.

* Previous trials not completed as cooking was too slow with lower pressures.

There were services that had been put in thirty or forty years ago, when the supply of gas was only used for flat-flame lighting; but matters had travelled far since then, and the addition of cookers and fires made all the difference. This was a point that needed to be kept in mind; and care should be taken that both pipes and meters were of ample size to supply the gas required with all the apparatus and lights going at the same time.

Mr. T. H. HAZELL (Newport) said it had occurred to him, when hearing the paper read, that it was just the kind of contribution which might be expected from one who was more or less responsible for the arrangement of the Swansea show-room. It certainly was a credit to the whole of their district to see such a show-room as Swansea possessed. Of course, it was not the only one; but it was one of the very best type, and one that was bound to be a standing advertisement for the commodity with which they all had to deal. It was not suggested for a moment that the paper, which was a short one, covered the whole of the ground connected with the subject of promoting gas sales. If he might be allowed to suggest it as an addendum to the paper, there had been adopted by some undertakings a very efficient method of looking after the vast number of gas-cookers that were in use. For this work, a lady visitor had been appointed. He did not know whether they had one in Swansea; but he had found from experience that it was a very useful plan. She went to every house in which a gas-cooker was fixed, and asked if she might see the apparatus, if the user was satisfied, and if there was any help she could give. Of course, the visitor must be an expert herself; and wherever she found that the cooker was not working satisfactorily, or that the housekeeper possessed only a limited knowledge of the proper methods of working, she offered her assistance. Incidentally, the lady visitor found that even those who knew how to use a cooker valued her advice, and were only too glad to get the hints she was able to offer; and, besides, she was often the means of discovering places where gas-cookers supplied under the prepayment system without extra charge were never used for cooking purposes. There were some people who utilized them as cupboards, for keeping boots and things like that in. To persons of this kind, the visitor talked seriously, and with great effect upon the output of gas. He could assure the members as a positive fact that the visits of the lady adviser they had at Newport had led to a distinct increase in the output of gas from within the first few weeks of her starting on the work. One little matter in the paper had rather struck him, and that was the trouble taken to show the results of the test of the "Super-Multicooker. It proved the disinterestedness of the gas people and of the reader of the paper, that such pains should be taken to demonstrate the fact that with this appliance the consumption of gas was something like 50 p.ct. more in the same time than with an ordinary efficient cooker. From the point of view of satisfying the consumer, it was, of course, right to state the facts as given in the paper. It would have been rather interesting to have had a comparison with an electric cooker. The claims in respect of these were so very strongly urged by those who were interested in them that occasionally people got hold of one and tried it. As a rule, however, it was soon discarded. He knew of several instances in which, when a demonstration was given by the gentleman whose particular office it was to push the sale of electric cookers, members of the local authority attended the lectures with their wives and were so taken with the beauty and simplicity of the arrangement that they decided to have one as an experiment. After three or four spoilt Sunday dinners, they began to kick the cookers out of their houses; and in some cases he knew that gas had superseded them. With respect to the claims that were made for heating by electricity, certainly electric radiators were pushed to the disadvantage, or the supposed disadvantage, of gas-fires. There had been an idea in his mind for some time that a very effective working model could be exhibited in a gas show-room, when the claim was made that electric radiators were so much better than gas-fires, by sitting a couple of smartly-dressed children in the window, one before the most up-to-date type of electric radiator, and the other before a good gas-fire. Each would have a pile of bread, and a competition would be started to see which heap would be toasted the quicker. If this were done in public view, the thoroughfare would be so crowded that the police would come upon the scene, and very likely summon the gas company; but it would be a splendid advertisement for gas. [Laughter.]

Mr. REGINALD G. CLARRY (Swansea) congratulated Mr. Cattell on the compilation of a very useful paper, which did not by a long way refer entirely to Swansea. Much of what was said applied to all gas undertakings. It was purely the domestic side he was concerned with in promoting gas sales. Of course, there were other directions. Industrial heating was a wide subject; and in Swansea they had really not made very great strides yet. But they were hoping shortly to do so. The all-gas house was a thing they ought to aim at, because it really formed an excellent show-room in itself.

Mr. W. C. JACKSON (Neath) remarked that they all benefited from the first-rate show-room at Swansea. He himself was much impressed with the point Mr. Madden had brought out, as to the standardization of the different appliances. Standardization had great advantages. For instance, take gas-burners. A man got accustomed to one sort, and small complaints were then much more easily remedied than if half-a-dozen different kinds of burners were being sent out. The part of the paper in which Mr. Cattell dealt with the bad results given by the "Super-Multicooker" had pleased him very much. He had been asked dozens of times why he did not get them for consumers, and was glad to have the information which the paper gave.

Alderman THOMAS CANNING (Newport) also joined in congratalating Mr. Clarry and the author on the possession of such an up-to-date show-room at Swansea. There was no doubt, he said, that in the promoting of gas sales the show-room took the first place; and this would become more and more emphasized as time went on. He knew that at times it might be difficult, and occasionally even impossible, to bring their committees to see the wisdom of having a good show-room and of expending money on exhibiting the articles that the public required. There was just one matter to which the author had not referred; the question of canvassing had been left out of the paper altogether. He (the speaker) was sorry it could not be omitted from consideration, for the simple reason that it was used so largely, and so very much to the detriment of the suppliers of gas, by those who were interested in electricity. The electrical undertakings by no means failed to make use of canvassing; they employed it largely, and with very big effect. He was pleased to see that in the show-room at Swansea there was given a place to the exhibition of charts and samples showing the products from coal gas; and he trusted that this would be taken note of and extended to every show-room. The war was inflicting very much hardship upon the gas business, running now into what might be serious financial hardship. But the Institution had three representatives—one on the Executive Committee of the National Gas Council, and two on a Sub-Committee to deal with these matters. No doubt, some relief would be obtained from the present financial difficulties; but they would have to raise money afterwards, and a show-room that exhibited the actual products would prove of great advantage to the investing public and to those who made the display. He had spoken of the disadvantages of the war; but one of its advantages had been that it had placed gas in a new light before the whole world. It had brought forward the admirable properties of gas, and had entwined it with every fibre of the national life. Gas was known now not only for its domestic uses, but as a great agent both for the navy and for the army. It was known as a big power in the commercial world, and for the vast advantage that it had been in the working of industrial concerns. The gas industry had also proved its great usefulness in connection with agriculture. He trusted, therefore, that in any advertisements that they might make of gas in the future, they need not confine themselves to the "parish pump" idea, but would carry the advertisements much further, and their just ambitions much higher than they had hitherto done. ["Hear, hear."] With respect to the "Multicooker," it had been adopted by one or two consumers at Newport; but he was glad to say that his Company from the beginning gave no support to it in any way. The appliance was not a success with those consumers who tried it; and before very long they ejected it. He would be glad if the experiment which was set out in the paper could be brought to the notice of consumers as widely as possible, in order to give them an idea of what they might lose if they adopted this system of cooking, which was supposed to be a matter of economy. Mr. Hazell's idea of having a competitition between a gas-fire and an electric radiator was a good one; but he did not quite agree that the best advertisement he could have would be to get into the police court. [Laughter.]

Mr. J. E. KENSHOLE (Merthyr Tydfil) said he agreed that show-rooms were a necessity in every district. Of course, the smaller undertakings could not hope to get show-rooms such as were to be seen in Swansea, Cardiff, and Newport; but in the majority of cases one that would show off the things effectively could be obtained. With regard to the methods of business in various districts, these differed very considerably; for what was found best in one place did not necessarily apply in another. He felt satisfied in his own mind that in seaside and other residential places where there were boarding-houses, and so on, it did pay to hire-out most gas appliances; but he totally disagreed that it was good policy to hire-out these things in colliery districts. Generally speaking, it was not a paying game. The author said that in showing the appliances one should have marked on them what it was going to cost the consumer to have them fixed. He was in disagreement with this. It must be within the knowledge of the members that to fix (say) a cooker in one house might entail an outlay of 30s. for piping, and in another house the cost might be only 2s. Instead of following the plan that they seem to have adopted at Swansea, his method was to mark the price of the cooker; and if they were asked what it would cost to fix it, the reply was: "We will send a man along, and let you know at once." It was utterly unfair that a consumer where 30 ft. of piping was required and there was possibly a wall or two to go through, should not have to pay any more than one in whose case the piping was already in close proximity to where the cooker was to be fixed. In his own neighbourhood, he knew he would have people coming and saying, "Why is it you charge us the same as Mrs. So-and-So, where the man was working half-a-day, while he was in our house only half-an-hour?" To his mind, it was far better to find out what would be the actual cost; and, if it was determined to do the work at cost price, let it be at cost price to each consumer—not do it at a loss in one case and a profit in another. The only other point he did not quite agree with was where the author said, "Have the price fixed complete shown against each, and be prepared to sell the mantelpieces and tile-surrounds and hearths, if required." Had they the power to do this? If there was an ironmonger in the place who was at all sharp, he would probably raise an objection and prevent it being done. He doubted whether there was an Act of Parliament in South Wales that gave power to sell mantelpieces and tile-surrounds. Most of them authorized the sale of gas-fittings; but he did not think these things could be termed "gas-fittings," and so would be rather afraid to do anything of that description.

The PRESIDENT suggested that, as the proceedings must now close, the discussion should be adjourned to a future meeting. There was no doubt, he said, that all places, large or small, should afford a show-room of some kind, as it must be of advantage all round. His own operations were on rather a small scale; but as a rule he took a shop in the main street for a month at the beginning of every lighting season. Anyone who did this would immediately realize the necessity of a show-room, if the circumstances did not in any way prohibit it. Having taken the room, he stocked it well with the latest appliances; and he never failed to clear the whole shop out by the end of the month. They then kept a stock in the show-room at the gas-works; but it had nothing like the effect of the shop in the main street. It satisfied the requirements of those who needed a specified article; but in creating new business it was far behind the other plan. Mr. Jackson had rather anticipated him in his remark as to the Swansea show-room being of value to them all. He himself made use of it to a very great extent; and he often wondered what Mr. Cattell must think of the rather high proportion of people who told him that "They would call again." [Laughter.] He (the speaker) varied the old request of shopkeepers, "If you do not see what you require, ask for it," by saying, "Anything you see in Swansea can be supplied here on the shortest notice." He did not know that it was altogether "cricket;" but it would be understood that being situated as they were, alongside a large town like Swansea, did not lessen their worries. They were continually being asked why they could not do this or that, as "they did it at Swansea." Then, of course, they had to get as near to it as

they could. They could therefore hardly be blamed for doing what they were able, to counteract the disadvantages of being near a large town. Why, they were even asked to supply gas at the same price as Swansea.

Mr. CATTELL pointed out that the type of "Multicooker" to which he referred was not the original form, which was exploded by the British Commercial Gas Association people very thoroughly. It was a new pattern, which was being largely advertised.

[It was then decided that Mr. Cattell's reply to the remarks made in the discussion should be held over until the next meeting.]

THE INFLAMMABILITY LIMITS OF GASEOUS MIXTURES.

A report issued by the United States Bureau of Mines summarizes the results of numerous experiments, from which it appears that the inflammability limits of gasolene vapour are 1½ to 5 p.ct., ethane 2½ to 5, methane 5½ to 14½, natural gas 5 to 12. acetylene 3 to 73, artificial illuminating gas 7 to 21, hydrogen 10 to 66, carbon monoxide 15 to 73, blast-furnace gas 36 to 65. The explosion chamber was in all cases large enough to prevent the cold walls appreciably affecting the result, and the figures are considered sufficiently accurate to possess commercial importance. In all cases the mixtures were at atmospheric pressure.

The effect of compressing mixtures of methane and air to six atmospheres was a slight extension of the lower limit and increased violence of explosion; and with a mixture of hydrogen and oxygen, compressed to 100 atmospheres in a steel bomb, the lower limit was only extended about 1 p.ct. Increase of initial temperature up to 200° C. had very little effect. Mixtures with oxygen in place of air greatly extended the high limit; that of methane being raised to 45 p.ct. A mixture of 9½ p.ct. of methane and 90½ p.ct. of air secured complete reduction to carbon dioxide and water. But if an excess of methane was present, oxidation was not complete; and if increased steadily, a point would be reached when the hydrogen and carbon monoxide produced would not propagate flame. Presumably the higher limits of the other combustibles would be affected in a similar manner; but the lower limits, which were the more important as regards danger of accidental explosions, were not greatly altered.

The above results were obtained with pure air of normal oxygen content, and this had to fall considerably before any noticeable alteration was observed. The low limit of methane applied to an oxygen content of 19 to 21; and the proportion had to fall to 14 before a non-explosive mixture was obtained—20 p.ct. of carbon dioxide, replacing an equivalent proportion of nitrogen, and raising the low limit of methane to 6·4 p.ct.

Electrolysis of Gas-Pipes.

In their column of "Current Topics" last week, the "Yorkshire Observer" wrote: Ever since electric tramways began to run, there have been complaints at different times, and from nearly every part of the world, as to troubles arising from the wasting away of gas and water pipes in the neighbourhood of tram-lines. The trouble arises from the fact that the return current, which should pass wholly by way of the tram rails, does not always do so. The ground in the neighbourhood of the tram rails, though usually of high electrical resistance, carries off certain small quantities of the current; and when these stray currents meet with pipes lying in the ground—such as those employed in the gas and water services—the currents flow along these pipes, leaving them later on to return to the rails, or else take some other path to the electric generating station. Where the currents leave the pipes, the moisture in the ground causes electrolysis to be set up; the oxygen of the moisture combining with small portions of the iron of the pipes. The amount of iron oxidized in this way per hour, or even per day, is very small indeed; but when it continues for months, its effect is gradually felt by the thinning of the pipes. The effect is the greater, the greater the difference of pressure between the far end of the tram line and the generating station. In America, in some of the early tram-lines there was as much as 50 volts difference between these two points. In the United Kingdom the Board of Trade laid down the rule some years ago that the maximum difference of pressure between the end of any tram-line and its generating station should not be more than 7 volts. This has not been found sufficient to entirely prevent electrolysis; and, in addition, the extension of the tram-lines of all the large cities to some distance beyond their boundaries has led to stray currents from one tramway system finding their way into the gas and water pipes of another town or district beyond its boundary. So far, no complete remedy has been found. Coating the pipes is of no service. The only methods that appear to have any chance of success are lowering the pressure at the end of the tram-lines by the aid of negative boosters, and bonding every pipe that is laid in the ground to the tram-line, and bonding every joint to every pipe, connecting the two sides of the pipes together across the joint.

Refractory Products in Germany.—The German Association of Manufacturers of Refractory Products has been dissolved, the "Ironmonger" reports, but some of the members have formed a new Association, with headquarters at Cologne.

PRINCIPLES AND METHODS OF A NEW SYSTEM OF GAS FIRING.

By A. C. IONIDES.

A Paper read at the Autumn Meeting of the Institute of Metals, Sept. 19.

The author's method of heating with gaseous fuel dates from June, 1909, when he was carrying out an experiment preliminary to constructing a calorimeter for testing the calorific value of petrol air-gas. The experiment was to ascertain whether or not the flues could be downwardly displaced in a calorimeter, in order to avoid any possible loss of heat.

At that time silica glass was a new material, and it so happened that a little prior to this date the material was exhibited for the first time at the Royal Institution. A test-tube about ½-in. inside diameter and 6 in. long, and a piece of ⅛-in. bore silica glass tube about 8 in. long, were acquired. Connecting one end of the silica-glass tube to the petrol air-gas by means of rubber tubing, the author ignited the mixture, and was astonished to find that it burned, and continued to burn, in the upper end of the inverted test-tube. Moreover, as the silica glass became hot, the flame either disappeared or became invisible, and the character of the combustion altered. The changed state of combustion continued indefinitely, and suggested that there should be no difficulty in transmitting a great part of the heat units of the gas to the object to be heated. This experiment may be said to have established the fact that flues may with advantage be downwardly displaced.

The first problem that presented itself in applying this new principle was the difficulty of establishing and maintaining a constant mixture. There are three main variables to be dealt with as regards mixture: (1) The inlet pressure of the air; (2) the inlet pressure of the gas; (3) the variation in consumption of either air or gas that may occur in any given installation.

THE PRESSURE-BALANCE.

This first problem was the most difficult of all to solve, since for domestic purposes, &c., it was necessary to deal with differences of pressure sometimes involving a consumption of (say) 2·7 c.ft. of gas per hour. Nevertheless, after a lapse of four years, this problem was solved by the construction of a device now known as a pressure-balance. It has been suggested that a better name would be a "mixing-balance;" and the author concurs in this view. This balance consists of a sensitive bell with a requisite length of seal. The inside of the bell is subjected to the static pressure of the gas, and the outside to the static pressure of the air. When the static pressure of the gas increases, the arrangement is such that the flow of gas cuts itself off, and the flow of air is to some extent increased. Likewise, when the static pressure of the air above increases, it shuts itself off, and opens the gas correspondingly, and *vice versâ* when the gas and air are decreased. A similar cycle of operations takes place when the consumption of the one or the other is increased or decreased. Therefore, by such a device, the pressures of gas and air are always held in a constant ratio, whatever the variation of either the inlet pressure of gas or air, or the consumption.

DIFFICULTIES IN HEATING WITH A NEUTRAL MIXTURE.

If a mixture of gas and air be rich in gas, the flame is correspondingly lengthened. On the other hand, if the proportions approach six or seven volumes of air to one of gas (according to the quality of the gas), it is quite possible, given silica or any other good catalyzer, to have no flame at all, but merely surface combustion. Now these conditions present great difficulties in heating with a neutral mixture—one which may be said to be neither oxidizing nor reducing—because of the tendency to local heating. Before this was finally and satisfactorily solved, another three years had passed.

Should a good catalyzer be placed at right angles to a stream of well-proportioned mixture, a glowing disc will be observed. On the other hand, if all catalyzers in front of this stream are avoided, the combustion can be spread out to a very considerable length. The author has proved by experience that with a ¾-in. injector, or even with one of ½ in., it can be spread out to a length of 3 ft. of almost homogenous combustion, by putting the injector into a channel of fire-brick opened at the top. In this way, the heat units can be distributed in a furnace, or boiler, or any other heating apparatus, in a very satisfactory manner.

The third point in the system under description resulted from an observation that the hotter the furnace grew the less was the consumption of gas. By taking into consideration the expansion of gases by combustion, some light is thrown on this phenomenon. What happens if the mixture enters the furnace at (say) normal temperature, 15° C.? Obviously, if it acts as a perfect gas, it will have expanded $\frac{1700}{273 + 15}$ or 5¾ times its initial volume.

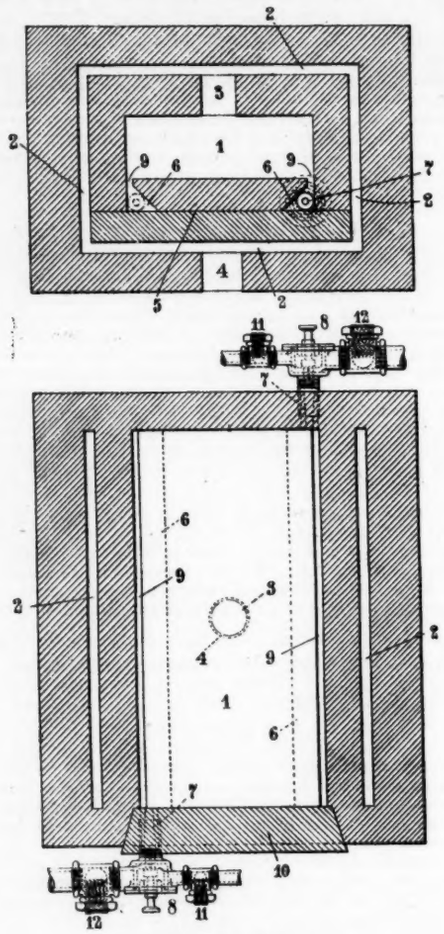
If the waste gases, instead of passing into a chimney open at the top, are displaced downwardly through a contracted exit of predetermined cross sectional area, this will cause a resistance to the flow of incoming gases and provide the elements of the most refined thermostat, without any working parts. In fact, by these

means, the temperature to be maintained can be predetermined with a pencil and a piece of paper.

Determining the Mixture.

The fourth problem was how to determine the mixture. After many trials, it would seem that the simplest plan is to fit an ordinary gas-cock with a piece of copper tubing bent with an easy bend and enlarged at the farther end, and screwed into the injector in such a manner that the enlarged opening at the end of the copper tubing faces the central axis of the delivery-pipe, in this way avoiding stream lines. Now, if a piece of india-rubber tubing and an incandescent mantle be fed with this mixture, the light will indicate the character of the mixture. If the meshes of the mantle are visible, it means an oxidizing mixture. If, however, the mantle is at its most brilliant point, the mixture will be very near the neutral point. On the other hand, if any unburnt gas is seen to escape from the mantle in the shape of a blue flame, the mixture will be an excessively reducing one.

There is a further variable to which reference has not yet been made, and that is the quality of the gas. This can be provided for by external distribution. Let it be assumed that there is a mixing-balance on the air and gas mains entering into a factory, and that all the injectors in the factory are properly calibrated and set for their various functions—brass melting, steel heating, illuminating, &c. When an unwelcome change in the quality of the gas occurs, it is immediately visible on one of the lights. A regulating cock on the air-main (preferably a screw-down tap) will at once put this right, and the whole of the factory will be compensated for this change in the quality of the gas.



Rectangular Barrel Furnace.

A heating chamber 1, having a door 10 at the front, is provided above and below, and, upon the greater portion of its sides, with jacketing flue-spaces 2. The chamber 1 communicates, by one or two central apertures 3, with the top flue space, and the heating elements passing through the aperture, pass downwards through the flues 2, and are finally discharged through the outlet-pipe 4. In the bricks 5 forming the floor there is provided along each of the two long sides a narrow combustion chamber 6, into which a nozzle 7 delivers mixture from a mixing device 8, provided with gas and air-adjusting means 11 and 12. The long combustion chambers 6 each deliver the products of combustion, by a long narrow slot 9, into the furnace-chamber 1. The nozzle is positioned at one end of the long combustion chamber, so that the heating elements, due to their travel along the chamber and their upward motion to escape through the slot 9, enter the furnace-chamber 1, with a diagonal movement parallel to the wall. The gases passing along the wall will tend to turn at the angle when meeting the adjacent wall, and thus a whirling motion of the gases round the walls of the chamber will be created. If the nozzles for the two combustion chambers are arranged at opposite ends of the furnace, as shown, this whirling will be accentuated; the gases being gradually drawn inward across the roof of the furnace-chamber on their way to escape at the outlet aperture 3.

Advantages of Employing these Principles.

From what has already been said, it will be readily seen that the conditions of conducting heat operations of many kinds on these principles are cleanly, and extremely economical in fuel. The economy is not only in fuel, but also in forgings. There is specially notable the facility with which a reducing or an oxidizing flame can be established and maintained—thus ensuring a consequent absence of scaling. Manufacturers have informed the author that they often have to scrap as much as 90 p.ct. of their steel forgings owing to scaling. The figures given by perhaps the largest users of furnaces for steel forging in Europe, after testing, for five months, a furnace for forging machine-gun barrals, were: Saving, 50 to 55 p.ct. Scaling, negligible. Therefore, it is perhaps unnecessary to state that, even if there were no economy in fuel, there would still be a great saving with regard to steel forgings.

A half-ton billet heating furnace has been made; and the figures given with respect to it were: Gas consumption, 1·3 c.ft. per lb. for full forging heat. Scaling, negligible.

In Table I. is given a list of figures relating to 70:30 brass, melted in a 20-lb. crucible furnace. These figures speak for themselves, and show that in brass melting an economy analogous to that afforded in steel forging can be effected. It might be added that Messrs. Vickers applied this system to a barrel-heating furnace 36 in. × 12 in. × 3 in. inside, which resulted in an agreement to establish the system throughout their works.

As an indication of the correctness of the principles employed, the author would point out that a light worked by means of a pressure-balance feeding a small incandescent mantle will produce

Table I.

Date 1915.	Lb. of 70:30 Brass Melted.	From Cold.		Second Heat.		Third Heat.		In the Presence of
		C. Ft. Gas used.	C. Ft. per Lb.	C. Ft. Gas used.	C. Ft. per Lb.	C. Ft. Gas used.	C. Ft. per Lb.	
30 Jan.	12·56	42	3·36	..	..	..	..	Dr. Harker, of the National Physical Laboratory.
2 Feb.	15	51	3·4	..	..	..	..	Mr. J. S. G. Thomas and Mr. Dean Chandler, of the South Metropolitan Gas Company.
3 ,,	16	52	3·25	..	..	..	..	Professor Louis, of Newcastle.
15 ,,	20	66	3·3	..	..	..	..	Messrs. Fletcher, Russell & Company.
24 ,,	16	60	3·75	..	..	..	..	Mr. A. A. Anderson, of the South Metropolitan Gas Company.
26 ,,	19	55·5	2·89	..	..	..	..	Mr. Charles Clare, Mr. Singleton, and Mr. Wilkins, of Fletcher, Russell & Co.
19 Mar.	20	55	2·75	..	..	..	..	Mr. H. J. Yates, Mr. A. S. Brayshaw, and Professor Bone
,, ,,	19·75	..	..	40	2·1	..	..	
,, ,,	14	..	..	..	..	27	1·92	
29 ,,	20	58	2·9	..	..	..	..	Messrs. J. & J. Braddock, of Oldham.
30 ,,	20	53	2·65	..	..	..	..	Mr. Hilton, representative of Messrs. J. & J. Braddock.
,, ,,	20	..	..	36	1·8	..	..	
,, ,,	14	..	..	..	..	..	2·08	
19 Apl.	20	56	2·8	..	..	..	..	Messrs. Keith & Blackman (Mr. Angus).
27 ,,	20	..	..	41·8	2·09	..	..	Messrs. Keith & Blackman (Mr. Keith and Mr. Angus).
20 May	19·5	77·5	3·98	..	..	..	..	Mr. Davis and Mr. Twigg, of the Davis Gas Stove Co.
27 ,,	20·50	..	2·83	19·25	2	18·50	1·86	Mr. Twigg and Mr. Gray.
21 July	20	..	..	28·5	1·4	..	..	Mr. Reeson, of the Gas Light & Coke Co.
14 Sept.	20	56	2·8	..	..	..	..	Mr. Arthur H. Kelday, of the Commercial Gas Co.

130 to 150 c.p., with a consumption of under 3 c.ft. per hour of town gas of standard calorific value; whereas, it can be stated, on the authority of Mr. J. G. Clark,* that the highest candle-power light obtainable at this pressure by other systems averages 22 c.p. per c.ft. of gas consumed (variable, of course, owing to the atmospheric burner).

To show the saving to the country that would be brought about by the use of these devices, it may be recorded that:

1.—A 3-in. pressure-balance saves 50,000 c.ft. of gas, or 5 tons of coal, per ten-hour day, as compared with a Brown and Sharp

* See "Journal" for May 4, 1915, p. 279.

furnace, which is considered by all small arms factories to be the best on the market.

2.—One thousand of these devices, in the manufacture of which 240 tons of combined iron castings and steel sheeting would be required, would save in six months—*i.e.*, 180 ten-hour days—the gas distilled from 900,000 tons of coal.

3.—Should the barbarous use of raw coal as fuel, which in itself is most wasteful, be discontinued, and this system be found to be equally economical with all forms of producer gas as with town gas, then in this country alone, where 250 million tons of coal are raised every year, these devices would save half the coal; or, in other words, they would double the industrial possibilities of England.

[At the close of reading the paper, Mr. Ionides demonstrated his apparatus. The temperature of the furnace was read off as 1600° C., and that of the flue gases 650° Fahr. During this demonstration, Mr. Ionides mentioned that Prof. Bone did not wish it to go forward that he was present at the demonstration of the apparatus on March 19, as mentioned in the paper. He only came in towards the end of the tests. Mr. Ionides took full responsibility for the figures.]

Discussion.

Dr. J. A. HARKER (National Physical Laboratory) thought that Mr. Ionides, in his attempt to condense into a few minutes what he wanted to explain, had rather forgotten to mention the root principle upon which his experiments appeared to be based. He wished to burn, not the usual mixture supplied, but an explosive mixture which had just approached the point when the velocity of propagation of the flame downwards in the particular mixture which was burning was just balanced by the rate of feed of the mixture upwards in the tube; so that the velocity of the flame remained more or less steady. It was the same as the old lecture-room experiment of a bunsen burner of large diameter supplying a very long tube containing a mixture coming from a jet below. On gradually turning down the quantity of gas, the character of the bunsen flame showed a marked difference according as the gas went through the various phases from a mixture in which only a little air was present to a stage when the explosion point was reached. When the quantity of gas was gradually diminished, the flame descended until at a certain point the cone, which was generally very well marked when the flame was burning in a wide tube, turned inside out, and often hesitated just at the mouth of the tube. If the experiment was carefully done, the flame could be made to pulsate slightly at a desired point. Mr. Ionides in his experiment had managed to do a rather difficult thing—did away with the instability of the flame; and by means of the pressure balance (which he had hardly alluded to in the paper), he had made an apparatus for burning an explosive mixture—a more or less fool-proof thing. As far as he (Dr. Harker) understood the experiments Mr. Ionides showed him two years ago, this seemed to be the gist of the author's work. He had modified a furnace so that, instead of supplying only a part of the air first and introducing the rest of it afterwards, he put all the air he required into his original mixture and made the mixture in such a way that variations in the gas pressure did not cause an extremely unstable flame which jumped about and, if the rate of movement in the mixture outwards in the burner became too small, caused the whole thing to light-back and go out. Mr. Ionides' real advance had been in making an automatic governor which permitted of the safe burning of an explosive mixture in a burner of more or less simple construction. Another thing the author had not alluded to was the very neat device for preventing the lighting back of the flame which had, however, been described in some earlier papers. Many accessory matters were mentioned in the paper; but the real advance was that the author had designed a comparatively simple outfit for enabling a mixture of any combustible gas to be made with the right amount of air to burn properly—the mixture being independent of casual variations in the rate of the supply of the gas. He did not think it mattered whether there was downward or upward displacement. He congratulated the author on having solved a distinctly difficult problem.

Prof. HENRY LOUIS also congratulated the author upon the brilliant result of his long-continued and careful experiments. He (the speaker) had had the opportunity of seeing them at a somewhat early stage; and the thing that had appealed to him most forcibly was seeing a furnace in which brass was being melted, and the products of combustion coming away at so low a temperature that the water condensed as it left the furnace. This brought the utilization of the heat generated very much further than he had seen before or even thought would be practically possible. From that time onwards, he had watched with very great interest the work that Mr. Ironides had done. As Dr. Harker had said, the thing that had been done was the precise regulation of conditions. It was perfectly well known that if gas and air were mixed and burned so that the maximum heat efficiency was obtained, a necessarily better result was obtained than if the proportions were allowed to vary. Nevertheless, the author had done a great deal of careful work upon this subject and in putting the theory into practice. There were one or two points which appeared to deserve a little elucidation. Tables were given in the paper showing the saving effected by this method; but it appeared that the author had omitted to debit the appliance with the heat consumed in generating the power required to produce the necessary pressure. This was a factor which ought not to be left out of account; and it was a point which required some consideration, especially when it was remembered that the whole of the air required had to be forced into the furnace by positive pressure. With an injector furnace of the ordinary Fletcher type, only a fraction of the total air required was forced in; the rest being drawn in by the air jet. But in the Ionides apparatus a very considerable amount of power was employed in this way; and he would like some information as to how the cost of generating this power affected the results which had been given in the paper. He was, perhaps, looking at the matter from the severely practical point of view of the engineer who had to discuss costs of appliances; and he hoped that a little more light would be given upon the subject. With regard to the air and gas balance, it seemed to him that if air and gas were forced in in regular proportions by means of constantly working blowers, it would be perfectly possible to do away with the pressure-balance. As he understood it, the pressure-balance was designed to equalize small fluctuations—fractions of an inch of water-gauge—in the pressure of the gas. If air and gas were being blown in at 10 lbs. pressure, surely it would be perfectly possible to so regulate the blowers that the balance would not be required at all.

Mr. S. N. BRAYSHAW said that, while (like the previous speakers) he had been extremely interested in the paper and demonstration of the Ionides system, it seemed to him that the author was not very well acquainted with what had been done by others, or with the present state of knowledge on the subject dealt with, or even with the construction and achievements of existing furnaces. The demonstration of an ordinary incandescent mantle against the other two was not a difficult thing to do; and any gas manager in the kingdom, with air under pressure, would be able to produce a like result without any very special apparatus. It was impossible to get perfect combustion in this apparatus, because of the absence of compressed air. There was not enough air drawn along to produce perfect combustion. The point of interest was the apparatus for maintaining constant pressure between the gas and the air; but the claims made for it were too great. It was said that a 3-in. pressure-balance saved 50,000 c.ft., or 5 tons of coal, per ten-hour day. He took it that a 3-in. pressure-balance meant one with a 3-in. main; and it would be a big pull to get 6000 c.ft. an hour through a 3-in. main. He did not think he personally could manage it; it would depend upon the length of the main. But taking it at 6000 c.ft., he thought it was too much to claim that a 3-in. pressure-balance would save 50,000 c.ft. per ten-hour day, or 5000 c.ft. an hour. It would claim serious attention if the author had said 500 c.ft. an hour. Such a claim would want looking into very closely, because it would be a big thing to save 500 c.ft. an hour. Many particulars were given in the paper, and many statements were made; but the only ones capable of discussion and verification were those about melting; and, as his name appeared there, he had no alternative but to make some remarks on this matter, because it ought not to go forth that the figures given in the table represented what could be done by this system commercially. What he had witnessed was brass being melted in a 20-lb. pot; but the manner of making the test and the construction of the furnace were applicable only to a laboratory, and could not under any conceivable conditions be applied to the workshop. It was not commercial melting. The brass was just fused, and poured when just perceptibly above the fusing point. But, even so, the results were disappointing. Under favourable conditions in a workshop 70/30 brass was being melted with 2 c.ft. of coal gas per pound; but he was safe in saying that normally, under commercial conditions, it would require about double what it was possible to do it with in the laboratory.

The PRESIDENT (Sir George Beilby, F.R.S.) interposed that this was the whole point. He admitted that double the amount of gas was required and this was the whole point of the discussion on a previous paper. Why should the works, which usually improved on the laboratory in things of this kind, have gone back in this instance?

Mr. BRAYSHAW said he could go into these points if he had time—matters relating to the construction of the furnace which made it possible to do in the laboratory things which could not be done in the works. The pressure-balance would no doubt be very useful in workshop lighting; but he felt sure that gas-furnaces were not going to be successful without recuperation, which involved varying the proportions of gas and air from time to time. At once the whole automatic principle dropped out, owing to the fact that the different amounts of heat required different proportions of gas and air. He did not think the system did anything that was not already being done better, although he agreed that the pressure-balance was a clever contrivance upon which a great deal of ingenuity had been expended. Nevertheless, it was not the only one on the market. He believed that the Keith-Blackman Company had one which was working very well. Though it had fallen to him to criticize the paper, he hoped some application would yet be made of the large amount of persevering work of which the paper was the outcome.

Mr. W. R. TWIGG (Davis Gas-Stove Company), while associating himself with the congratulatory remarks that had been made with regard to this very interesting system of gas firing, also associated himself with what had beeen said by Dr. Harker and Mr. Brayshaw. In this latter connection he could produce a little information which he hoped would be interesting and of some service. As stated in the paper, he had witnessed a demonstration of the "Captive Fire System," and he was immensely struck with the accurate working of the pressure-balance, and the ingenious nature of the whole device. These tests were witnessed by him on May 20 and 27; and it struck him then that what he saw was not sufficient to enable him to arrive at satisfactory conclusions as to the value of the principle. As Mr. Brayshaw had said, the tests were conducted in a way which could not be compared with practical workshop conditions, under which conditions most of the figures that he had at his disposal at the time were arrived at. Therefore, he thought he would make some special tests under somewhat similar conditions. The tests he had witnessed included the melting of 20 lbs. of brass in a small crucible furnace of the type that had been demonstrated that evening; but the brass was cast into an ingot of a shape exactly to fit the crucible. The products were displaced downwards, and the other points in connection with the "Captive Fire System" were all included. Therefore, he returned to the works and made some tests on a 20-lb. crucible furnace using the ordinary type of air-blast burner associated with the furnace he was responsible for. It was an ordinary burner, and the furnace was of ordinary construction—similar to those in which was being done to-day the melting of brass, gunmetal, cast iron, nickel, and nickel-tungsten alloys. The results he obtained were as follows: On June 26, 1915, 3·05 c.ft. of gas were used per pound on the first heat; on the second heat, 2·1 c ft.; and on the third heat, 1·95 c.ft. On June 28, the respective figures were 3·15, 2·15, 1·9; and on a fourth heat 1·8. On July 15 a further test was carried out, which was witnessed by a responsible member of the staff of one of the large London gas companies. The results then were 3·5 and 1·65. The averages of these results were: 3·23 for the first heat, against 3·13 for the tests given in the table in the paper; 1·95 for

for the second heat, as against 1·88 in the paper; and 1·95 for the third heat. In the only case where a fourth heat was taken, the figure was 1·85 c.ft. per pound. The conclusion he had come to was the same as that mentioned by Dr. Harker—viz., that it did not matter whether they used downward displacement or not, so long ae the melt was carried out in a furnace with an efficiently constructed fire, and with an efficient burner to give a properly aërated flame. In conclusion, he would like to say that, while he appreciated the persevering and painstaking way in which he knew the author and his assistants had elucidated many difficult and tricky points, he could only regret that figures had been put forward as conclusive proof of the statement—which if not made was inferred in the paper—that by means of the "Captive Fire System" brass could be melted at 50 p.ct. less cost than was being done by recognized methods to-day.

Mr. J. G. CLARK (Gas Light and Coke Company) referred to the statement in the paper that he had in the "GAS JOURNAL" asserted that the highest candle power light obtainable at a pressure of 3 to 4 inches—*i.e.*, ordinary gas distribution pressure—was 22 candles per c.ft. He had been puzzling his head to know what he was talking about when (and if) he made such a statement. He was pretty certain that he did not say what the author had made it appear. He hoped he knew more about gas-lamps than that, because the figure was nearer 35 to 40 candles per c.ft., without resorting to any increased pressure beyond what the ordinary mains provided, and without resorting to any appliances external to the lamp itself. As, however, he could not recall exactly what he was referring to on the occasion named, he must take the opportunity of looking the matter up; but he was quite sure he could not have meant what the author had led his hearers to believe. With regard to the photometry tests that had been carried out that evening, he would suggest that too much importance should not be attached to the demonstration, because anybody who knew anything about photometry knew very well indeed that it was an art which had to be practised under very exact conditions; and the conditions existing in the meeting room were far from satisfactory from the photometrist's point of view. Regarding the candle power that could be obtained with the author's air-gas system, some seven or eight years ago he made some experiments on certain air-gas systems, and obtained candle powers he believed up to nearly 50 per c.ft. The author claimed 47 candles for his system; so that, as far as air-gas systems were concerned, we stood very much where we did then. As a matter of fact, we had better systems of using gas for lighting by simple high pressure, giving up to 60 candles per c.ft. simply by using an ordinary compressor. Therefore, they must not go away with the idea that this system was a very great advance over those already in use. With regard to the list of variables which the author had exhibited, too much importance must not be attached to them. For instance, No. 3, "Pressure of Gas Supplied." The author knew that the pressure of gas varied; it must vary just as did the pressure of any other fluid distributed about a district. Pressure must be lost whether it be gas or water; and in electric circuits pressure was also lost in long circuits. Then, as regards maintaining the pressure of the gas, governors for preserving constant pressure were probably as old as the gas industry itself; and one need have very little fear that the pressure of gas would be a difficulty. The author also referred to the pressure supplied by air compressors. Again, this could be controlled by governors, so that there was an absolutely constant pressure the whole time, and not only constant but of any value desired, in spite of the variability of the atmospheric pressure. Unfortunately, we had no control over the barometer; it would go up or down regardless of anything we did; but it was to be remembered that the pressure of gas was always pressure above the pressure of the air. When we spoke of pressures of 3 in., it meant 3 in. above the pressure of the air. The barometer within the next quarter of an hour might go up one-tenth, which was equal to rather more than a one-inch head of water; but the gas pressure would go up at the same time, because it was the difference between the air and the gas which gave what was called gas pressure. Therefore, although one could not control the movement of the barometer, they did not care very much whether it went up or down—it did not affect the gas supply at all. The other variables might also be dealt with in the same way. They were given undue significance.

Mr. L. C. HARVEY associated himself with the previous speakers who had "jumped" on the author. In Mr. Thornton's paper last year, reference was made to the melting of brass in which the gas consumption was given as 2·1 c.ft. per pound; and the author did not do very much better than this. In this, he was rather disappointed, because he had hoped that Mr. Ionides was going to show something that had never been seen or heard of before. He could only hope that the author would in the future be able to so improve his results that he would get down to 1·5 c.ft. or even 1 c.ft. per pound of brass melted. The results in the paper, taken under what had rightly been called laboratory conditions, were rather disappointing, because at the last meeting they had had a similar case in which only 30 lbs. of brass had been melted. These were not practical conditions; and if Mr. Ionides had only got a furnace to melt 200 or 300 or 400 lbs. of brass, and had given some really definite figures of gas consumption for this amount of metal, then we should be able to see where we were, because these small gas-furnaces were relatively more efficient than the large ones. The heat of combustion was generated more efficiently because of the short distance from the orifice of the burner; and the furnace could be heated much more rapidly and economically than the large one in which there was a relatively large combustion space and the gases were travelling at a higher rate. Thus the efficiencies of the commercial furnaces were far below those of laboratory tests. Then the system of downward flow exhaust gases was not at all new. It had been applied over and over again. The difficulty that he had personally found in the passage of gas in a downward direction at the back of the refractory wall, was the impossibility of finding a refractory at the present time which would stand the heat in a brass furnace. It was all right in a steel melting furnace. With 1400° C. inside the furnace, and the gases being passed down the back, unless the wall was of very great thickness, the present refractories would melt. If by passing the waste gases down the outside, heat losses were being conserved, then the efficiency was being improved. But it really rested with the refractories.

Mr. E. P. TAUDEVIN (Richmond Gas-Stove Company) called attention to the reference in the paper to a gas consumption of 1·3 c.ft. per pound of steel heated to a full forging heat. The remarks in this connection would lead one to suppose that the system had been applied to the heating of heavy forgings. He would like to know the type of furnace in which this forging was heated—whether it was cylindrical and of the same form as the billet, because the billet mentioned in the paper was a half-ton billet. He also assumed that the fuel referred to was town gas. British thermal units, of course, did not always cost the same amount of money to produce; and assuming this 1·3 c.ft. referred to town gas, the cost would be 0·039d. per pound of metal. With a modern producer gas furnace of the continuous type (there were many in this country to-day on account of the war), 20 tons of steel billets could be heated with 2½ tons of coal—*i.e.*, gasified coal through the producer. This would work out to 0·02d. per pound of metal, against 0·039d. in the case of Mr. Ionides' system.

The PRESIDENT, in closing the discussion, asked for contributions for publication in the "Proceedings" of the Institute.

Mr. IONIDES, replying to the discussion, first dealt with the point raised by Mr. Taudevin. The type of furnace in which the half-ton billet was heated was exactly the type that had been demonstrated that evening; and if it was desired to know who made it, it was Mr. Twigg. Mr. Twigg had not mentioned that he made the furnace. In stating that he had made comparative tests after he had seen a demonstration of the process, Mr. Twigg did not say that his firm had been in negotiation for a year with a view to acquiring the patents of the system. This was his answer to Mr. Twigg. As regarded Mr. Brayshaw, that gentleman took notes on the occasion of the demonstration mentioned in the paper at which he was present. Would he mind stating the temperature at which the brass was at the third melt?

Mr. BRAYSHAW said he did not take the exact temperature.

Mr. IONIDES retorted that Mr. Brayshaw had made the statement that the brass was only just fused.

Mr. BRAYSHAW said that was so. It was poured as soon as it would pour.

Mr. IONIDES said he accepted this explanation.

A hearty vote of thanks was accorded Mr. Ionides at the close of the discussion.

Gas and Business System.

Subjects connected with business organization, management, and routine are thoroughly dealt with in "System"—a publication, that is to say, whose monthly issues have to cover a very wide field. The September number includes something to interest everybody in business; and there are, among the contents, two articles which call for mention here. In the first place, manufacturers are shown how gas is able to reduce their expenses and secure greater output; a recital of the undoubted advantages in all manner of industries of this form of fuel being accompanied by a very good series of photographs. It may be noted that, so far as manufacturers in general are concerned, the fundamental advantages to be gained by the adoption of gas are stated as: (1) Economy in storage and labour in cartage of fuel; (2) no labour or machinery is required for the cartage of ash and removal of soot; (3) furnaces can be installed in practically any position, thus bringing the workers and the machines in closer proximity; (4) no high chimneys to erect and keep in repair; (5) the automatic fixing of temperatures, thus saving labour in stoking and watching of heating records; (6) increased production, owing to the absolute control of temperature. Coming to actual examples, one firm is quoted as having calculated that the adoption of gas-furnaces in place of solid fuel secured for them the saving of two-thirds of their floor space, full-time labour of a stoker, and nearly one-third of their fuel bill. They secured absolute reliability, abolished soot and smoke, and obtained the same output with less trouble. The second article deals with lighting, and emphasizes the advantages of good illumination in a factory, from both the point of view of safety and the most efficient working. The need for emphasis of this kind has unfortunately been proved by innumerable instances of badly lit workshops; but better methods are being more and more adopted.

Alderman Lazarus Hart, of Ramsgate, whose death was announced a fortnight since, has left £10,000 to the Corporation and an acre of ground, for the purpose of endowing and building ten "Havens of Rest," for persons of any age or sex. Not more than £3000 is to be expended in building the havens, £1000 is to be invested and the income applied to keeping the buildings in repair, and the balance is to be invested and the income divided equally between the ten inmates. The Alderman's two employees, who have been with him for many years, are to be entitled without vote to become inmates of the havens if they so desire.

The Refractory Materials Section of the Ceramic Society will hold a meeting in the Royal Technical College, Glasgow, on the 2nd and 3rd prox., at which the President (Mr. W. J. Jones, of the Ministry of Munition) will take the chair. A number of subjects will be discussed, including the "Refractory Properties of Silica" (by Messrs. H. le Chatelier and B. Bogitch), and the "Testing of Refractories" (by Dr. J. W. Mellor). There will be a visit to the Dalzell Steel Works, a dinner, and a popular evening lecture. The Council have not yet made arrangements for the following meeting; but among papers provisionally promised is one by Mr. J. P. Leather, of Burnley, on "Refractories in Gas-Works, from a User's Point of View."

THE STATUS AND PROSPECT OF GAS LIGHTING.

From an American Point of View.

The President of the Illuminating Engineering Society of America (Mr. W. J. Serrill) prepared an address for this year's "Correspondence Convention," which was arranged to take the place of the abandoned autumn meeting; and prints of the address were available last Thursday.

He commenced by dealing with the progress made by the Society and certain considerations as to its general character and position, and then briefly noticed the work of some of the Standing Committees—maintaining that there was much to be said in justification of the Society, whose main policy was to foster and develop all types of artificial lighting.

He proceeded: I shall make no attempt to urge the advantages of gas lighting, as they are sufficiently set forth by those whose business it is to exploit them. I shall approach the subject from another side—considering briefly, one by one, the obstacles or handicaps which in the past have stood, and which to some extent still stand, in the path of gas lighting, tending to retard its progress, and weaken it in its competition with other illuminants. The discussion will naturally involve some consideration of the prospect of the abatement or removal of these obstacles. I shall not name these handicaps in the order of their importance, nor attempt to classify them from that standpoint, but shall begin with the qualities of the fuel, and follow along (in the natural order) to the policies and practices surrounding the introduction and maintenance of the burners.

Lack of Uniformity an Obstacle to Good Lighting.

The first obstacle to good gas lighting to be considered is lack of uniformity in the fuel delivered to the burner. This does not mean that only one quality or kind of gas should be made all over the country. Generally speaking, any of the gases that are in vogue anywhere are satisfactory, in the sense that existing types of gas-burners may be adjusted to give efficient results with them. It does mean, however, that when burners are once adjusted and in use, it is highly desirable that the fuel thereafter fed to them be kept uniform. It thus becomes a problem for the individual manager in each city or territory that is separately supplied. The modern gas-burner, being a creature of small orifices and delicate adjustments, if it were endowed with the gift of tongues, and with a knowledge of what is expected of it, would cry "uniformity, uniformity" with every molecule of its structure.

In the past, principally two kinds of gases have been general—coal gas and water gas. But in recent years coke-oven gas has become an important factor with many companies. These gases differ from each other in gravity, in heating power, and in air requirements—*i.e.*, the volume of air necessary completely to burn a unit volume of the gas. Many important considerations have led the larger gas companies to equip themselves with apparatus for making two of these gases, and to distribute a gas that is a mixture of the two. Under these conditions, the maintenance of a desirable uniformity in the gas, at all seasons, is not easy.

The effort to maintain a standard candle power as the one standard quality of the gas has been the principal cause of variability in the other qualities. This standard candle power quality, now happily in process of abandonment, but still enforced in many cities by governmental ruling or contractual agreement, can be maintained in the gas as delivered to the burners during the changing temperatures incidental to the seasons, only by varying the proportions of the gases in the mixture, or by processes of enrichment; and these changes automatically cause the variations in the other qualities of the gas which are harmful to the cause of good gas lighting. Candle power as a quality of the gas is useful only on the open-flame burner. It has no value in the incandescent gas-burner. On the contrary, the effort to maintain it introduces effects that are detrimental to incandescent gas lighting. Thus it is seen that the whole course of the development of incandescent gas lighting, since the introduction of the Welsbach burner, has been retarded and handicapped by the enforced adherence to an obsolete and harmful quality in the gas. The least efficient and most wasteful type of burner has been coddled, to the positive detriment of the type on which the future of gas lighting depends. It is one of the bright spots in the future of gas lighting that this incubus is in process of abatement. By common consent, the gas industry is abandoning the candle power standard, in favour of a heat-unit standard, for the gas. In many towns this transformation is an accomplished fact; in others (including some of the larger cities), it may not take place for years.

However, even with this chief source of variability removed, the maintenance of a desirable uniformity in the gas is still a question demanding the constant attention of the manager. When working to a heat-unit standard, a uniformity of air requirement and of gravity is more easily maintained than under a candle-power standard. But it will not maintain itself; it will continue to exist only as the result of unceasing vigilance. Economic and labour conditions demand, for many cities, that a fairly standard quantity—sufficient for the summer output—of coal gas be made, and that the extra quantity for the winter consumption be supplied by water gas, made only during that season. This means a gas of varying qualities; and the problem confronting the manager in such cases is how to introduce these changes with the least possible effect on the incandescent burners—how to maintain a gas calling for a nearly constant air requirement, as the proportion of water gas intermixed gradually increases, and then, after reaching a maximum, gradually decreases with the approach of spring. Some of the ablest minds in the industry are now engaged on the different phases of this question.

Again, unexpected or unforeseen conditions sometimes arise, which tend to destroy uniformity. The present shortage in the coal market, due to the great war, may be cited as an instance, This condition has forced some companies, who have been distributing water gas for years, to swing over to coal gas. In such a change, the incandescent gas lights are bound to be affected; but with the absence of a candle power standard to be maintained. and with a new sense of the importance of uniformity which the modern gas manager possesses, even such changes will produce a smaller detrimental effect upon the gas lighting conditions than formerly.

Another source of variability, of a type that is entirely inexcusable, arises out of the manager's failure to realize the serious effect produced by sending out, even temporarily, an unscrubbed gas, or one containing constituents that normally are removed. It usually arises in this way: Some alteration, replacement, or renewal in the manufacturing plant is undertaken, without any provision being made for the temporary treatment of the gas during the interval that elapses between the taking out of the old installation and the introduction of the new—on the assumption that, for so short a period, a gas that is not normally treated will do no harm. This state of the managerial mind, once quite prevalent, is growing scarce. He knows now that he may, in a few minutes' time, by omitting precautions of the nature indicated, seriously affect his gas lighting business.

The Candle-Power Standard another Obstacle.

The candle-power standard has been an obstacle in the path of incandescent gas lighting, not only by tempting consumers to keep the uneconomical open-flame burners in use, because of the high candle-power of the gas, not only by rendering it impossible for the manager to distribute a uniform gas such as is demanded by the incandescent burner, but also by the psychological effect it has had on the gas manager himself. It has lulled him into a sense of false security. By tradition, thinking largely in terms of the open-flame burner, the enforced maintenance of the candle-power standard, conserving a quality in the gas that is useful only on this type of burner, has emphasized this thought—thus measurably retarding the day, now happily dawning, when the manager faces-about, and for the first time looks squarely in the face the requirements in the fuel that are demanded by a good incandescent gas lighting service. At no very distant period in the past, all gas lighting was by the open flame. Gradually, the incandescent type has replaced the open flame, but quite gradually, and by no means entirely, even to this day. The open-flame burner is indifferent to wide variations in the quality of the gas, so long as the candle power is maintained. How natural, when a candle-power standard is in vogue, to rest comfortably in the thought that by maintaining this standard, one has done his whole duty by gas lighting! Fortunately, for the future of gas lighting, the manager now knows differently.

Uniform Pressure a Requisite.

The demand for uniformity by the incandescent gas-burner is not, however, completely met by the unbroken delivery of a gas of uniform quality. This uniform gas must come to the burner under uniform pressure. To variations in the pressure are due many of the causes of dissatisfaction with gas-burners. The rules of the Public Service Commissions of the several States usually provide a maximum and a minimum pressure permissible at any burner, and an allowable degree of daily variation above the minimum. These provisions are very seldom unreasonable. The gas manager knows that the requirements of a satisfactory lighting service call for a variation considerably less in volume than the variation these rules generally allow.

Strictly uniform pressures are possible only on high-pressure systems, with a governor on each service. Pressures approaching this ideal of uniformity may be obtained on low-pressure systems, such as are the majority of gas distribution systems, by utilizing a system of feeder mains, or a belt-line filled with pumped gas and provided with governor stations located so as to feed into the distribution system at numerous points. Such devices, of fairly recent introduction, enable the manager to maintain more uniform pressures throughout his territory than formerly, and to do so at a less charge for capital investment. The modern tendency to carry higher pressures generally, causes automatically a smaller percentage of daily variation in the pressure at any point in the main system. These causes, in connection with a keener appreciation on the part of gas managers regarding the importance of pressure variations as a factor in the gas lighting service, are gradually removing what has in the past constituted a somewhat serious handicap.

Greater ease in maintaining a uniform gas at the burner is not the only benefit the cause of gas lighting enjoys by the abandonment of the candle-power standard. An additional advantage lies in the smaller quantity of condensable hydrocarbons in the gas. Adherence to the candle-power standard required the maintenance of a fair—sometimes a large—quantity of such condensable content; while compliance with a reasonable heat unit standard permits a material reduction of it. In a properly adjusted burner, the presence of such hydrocarbons in their normal vaporous form

is unobjectionable, as they are completely consumed in the burner; but the seasonal variations in temperature (in the mains underground, in the basements, and in the interiors where lamps are located), whereby the temperatures in these three places vary so that each in its turn may become higher than the other two—these seasonal variations bring about the condensation of part of the hydrocarbons, and its deposit in liquid form. The presence of this liquid deposit, becoming solid or semi-solid when subjected to burner temperatures, has in the past constituted a very serious obstacle to a good gas lighting service. These deposits have been the cause of what is sometimes popularly called a "dirty" gas—now happily disappearing with the exit of the candle-power standard. Compliance with a heat-unit standard permits of a sufficient reduction in the condensable hydrocarbons to prevent any deposit under ordinary seasonal ranges of temperature; and it thus secures greater insurance against those lighting troubles which these deposits cause. Here again we see in process of abatement one of the handicaps under which incandescent gas lighting has laboured.

Impurity of the Gas an Evil.

An evil incidental to the modern forms of gas lighting, which was not so objectionable with the open-flame burner, arises out of the presence of traces of sulphur in the gas, in the form of carbon bisulphide and several obscure sulphur compounds. The ordinary methods of gas purification, which effectively remove all traces of the ordinary sulphur compounds, do not touch these special combinations of sulphur. The burning of gas, however, destroys them, and liberates the sulphur in the form of sulphurous acid. The quantity so liberated into the atmosphere is so small as to be unobjectionable. Indeed, the atmosphere of rooms lighted by gas does not show any higher percentage of atmospheric sulphur than does the ordinary atmosphere of our modern cities, which is charged with this substance to a greater extent than formerly by the combustion of solid fuels in house furnaces and manufacturing processes. However, while these traces of sulphur are negligible as vitiators of the atmosphere, their presence in the products of combustion issuing from gas-burners, nevertheless, produces certain other objectionable effects which gas lighting would like to dispense with. It is a factor in increasing the discoloration of burners and fixtures, and of walls and ceilings, caused by the continual impingement of these products of combustion. If these products were absolutely devoid of sulphurous acid, it is probable that the objectionable discoloration of burners and fixtures would be materially reduced.

The darkening of walls and ceilings, which constitutes one of the greatest handicaps under which lighting by gas suffers, is not caused solely by the sulphurous acid in the products. The presence of this compound, however, is a potent factor in causing it; and the complete removal of the sulphur would materially retard the growth of the stain, and also diminish its intensity. The removal from the gas of these obscure sulphur compounds is, unfortunately, not easy, while it is expensive. The subject is engaging the attention of the ablest chemists and engineers in the industry; and the outlook for the development of a feasible process of purification that will entirely eliminate them is by no means hopeless. If gas lighting is to hold its proper rank in the field of artificial illumination, the accomplishment of this object is important.

The elimination of condensable hydrocarbons from the gas, incidental to the transfer from a candle-power to a heat-unit standard, by removing a tendency to cause smoke, due to clogging of orifices in the burners, is another factor in lessening the evil of darkened walls and ceilings. Not anything that it is in the power of the gas industry to do, however, will entirely remove this objection. Caused by the impingement of atmospheric dust carried by warm air currents, this effect is seen above, or near, any object whose temperature is such as to induce currents of air. The effect is proportional to the volume of the current and the length of time during which it impinges, assuming an equally dusty atmosphere. In so far as the gas-burner generates a large quantity of heat, it cannot avoid the impingement of a correspondingly large volume of the dust-laden air. It can look for relief from this trouble only in a reduction of the quantity of dust and dirt in the atmosphere, or by an increase in the efficiency of light production. In residences (especially those of the better class, in which this evil is more objectionable than elsewhere), there is reason to expect in the future a more dustless atmosphere, due to the introduction of a gaseous house-heating fuel, to the more general use of vacuum cleaners instead of brooms, and to cleaner city streets. In passing, it is worth noting that less dust in the air in residences will have another beneficial effect on gas lighting, in that it will retard accumulations on the burner gauzes, and thus lengthen the period between maintenance visits.

Ignition and Distance Control.

Second only to the handicap of discoloured walls and ceilings (if, indeed, not of equal importance) are the problems of ignition and distance control. These have to do with the factor of convenience—an attribute of prime value. They are recognized as problems of fundamental importance; and there is no need for me to dwell on them in this place. Mechanical and chemical inventiveness have accomplished much in the efforts to solve them; and there is no reason to believe the end has been reached.

Types of Burners Supplied Free.

An obstacle to the full development of gas lighting is a practice still followed generally by gas companies, which is based on a policy which the industry has drifted into, rather than consciously adopted. This is the practice by which the open-flame (the least efficient) burner is given away freely to consumers, while the various forms of the incandescent (the most efficient) burner are only sold at a profit. This practice places a handicap upon the introduction of the incandescent burner, while obviously it is the true interest of the industry, in its competition with other forms of lighting, to facilitate the introduction of its most efficient appliances. It is not difficult to trace the path of this now mistaken policy. When all gas lighting was by the flat-flame burner, gas companies generally adopted the then liberal policy of giving these burners, without charge, to consumers. The expense was small, and the inducement to the consumer thus created was worth while. The replacement of the flat-flame by the incandescent burner has been a gradual process; the adherence to the candle-power standard has, as already explained, kept the flat-flame burner in an undeserved relative prominence; and the gas manager, as in all long-established industries like the gas business, has been conservative. Thus this old practice has continued by virtue of its own momentum. Of course, there was less objection to it when gas lighting, even by the flat-flame burner, was less expensive than competing forms of lighting; but since this margin has grown smaller, or has disappeared, the practice has become increasingly unjustified. And yet it is generally followed to-day. Some progressive companies are now charging for all flat-flame burners, and are shaping their new-business policies so as to throw every inducement in the way of consumers using nothing but incandescent gas-burners; and there is little doubt that gas companies generally will follow suit.

Standard Types of Burners and Mantles.

The subject just considered brings us naturally to another, which is matter for serious concern to gas lighting interests. The gas industry has not shown itself able to control the quality of its incandescent lighting appliances. Inefficient, poorly designed and constructed burners, and flash mantles constitute a very serious evil. And yet it is only within a comparatively recent date that the industry may be said to have considered it seriously. The national societies are now wrestling with the problem of standard designs and specifications of burners and mantles. So far, within my knowledge, no gas company has thought it worth while, in order to control the situation, to make free installations of standard burners or even of standard mantles. In time, competition may bring them to it. Some companies, however, are using all their influence to reduce, or altogether stop, the sale of cheap burners and mantles by storekeepers in their cities, and to encourage their consumers to purchase all supplies from the companies. The fact that gas mantles, of a kind, may be made by relatively unskilled labour, and with plant requiring so small a capital investment, is a detriment to the cause of gas lighting.

Gas Companies, Plumbers, and Gas-Fitters.

Still another question of mistaken policy, inherited rather than adopted, comes to mind. It has to do with the relations between gas companies on the one hand, and plumbers and gas-fitters on the other. In order to facilitate and promote the introduction of gas cooking and other fuel appliances, gas companies generally have long followed the practice of including the connection with the sale of the appliance, and of installing the piping connection by their own workmen. Again, while many gas companies have refrained from installing in new houses at the time of their erection, the complete piping system for gas lighting (leaving this work to the plumbers), still, even in the lighting field, the desire to promote installations has led many gas companies to include in the sale of burners any piping that may be needed to hang the burners. This piping work done by the companies has, as a rule, cost the consumers less than the plumbers can afford to do it for. This practice has resulted in the plumbers and gas-fitters feeling that the gas company underbids them, and injures their market. Instead of every gas-fitter in town being a friend to the gas company and a promoter of gas lighting, as he should be, too often he is indifferent or actively unfriendly. Within a recent period, the unwisdom of this situation has been appreciated; and at least one of the larger companies has, within my knowledge, adopted a policy the reverse of the traditional one.

Poor Illuminating Engineering.

Generally, poor illuminating engineering on the part of the gas company's salesmen may be fairly cited as one of the handicaps to which gas lighting is subjected. Many causes contribute—the salesmen are paid by a method which induces them to increase their sales at any cost, or by a method which induces them to select for sale, not the burners which are best for the location, but those which return the best pay to themselves, or campaigns are undertaken in which only one type of burner is offered, or the salesmen are insufficiently instructed in the principles and practices of illuminating engineering, or to practice illuminating engineering would require a more careful study of the conditions than the salesmen have time for. I am offering no criticism of these causes, as many of them are unavoidable, or at times a given practice is advisable in spite of certain objections to it. It may, however, safely be said that these conditions tend to improvement. Salesmen generally are receiving more thorough instruction in illuminating engineering; they are as a class better experienced in its practice. One of the National Societies has inaugurated an excellent course of instruction for them in this subject. Gas

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managers, largely through the influence of our own Society, are more keenly alive to its importance.

During recent years there has grown a conviction in the industry that gas companies should inaugurate systems by which their employees would visit consumers' premises to examine and maintain their gas lighting appliances. Some systems of this nature are in operation at the present time. As a description of these is the subject of a paper to be presented before this Convention, I shall make no further comment, except to say that the growth of a sentiment favourable to maintenance systems is a hopeful sign.

More Street Lighting by Gas Wanted.

It may seem grotesque to include the backwardness of the gas industry in promoting street lighting by gas as constituting in any sense a handicap. Yet I think it is worthy of brief consideration here, as it marks a failure properly to utilize an effective means to publicity, of which gas lighting stands in so much need. Any article appealing to universal popular favour, no matter how excellent in itself, cannot hope to achieve its greatest success minus this indispensable ingredient. Such is the nature of our public; it pays to advertise. And how better can the gas industry advertise its lighting product than by effective, showy street lighting? Ornamental lighting by gas, appropriate for park-ways, boulevards, and the show places of cities, is entirely feasible; and if it is undertaken by gas companies as an advertisement and a means to publicity, and not as a means of making money, there is reason to believe that much of it may be secured. So long as there is a slight or no demand, it is natural that but few properly artistic fixtures should be available.

A condition that, in one way or another, has had a retarding effect on the progress of the gas lighting business may be expressed in the word "rates." Long acccustomed to sell their product at a rate that was uniform under all conditions of use, gas men are at this day only novices at the difficult and delicate art of rate-making. While differential rates for gas are of more importance to the industry in the fuel end of its business, still its slowness in utilizing this efficient means of increasing sales, and reducing costs, has undoubtedly had a retarding effect on the progress of the lighting end. A realization of this fact is spreading rapidly.

Indifference a Serious Obstacle.

I have reserved for the last the most serious obstacle that threatens gas lighting to-day. As might be expected, it is an internal enemy, not one that menaces from without. It is indifference. Is the effort to promote gas lighting, to extend it in the face of active competition—especially in view of the splendid prospects of the fuel end of the business—after all worth while? For one cause or another, this paralyzing doubt is but too common among gas men. In the face of it, how can the gas lighting business expect to progress? Circumstanced as it is, nothing but positive, vigorous, enthusiastic effort, exerted by men who really believe in it, and are determined to make a success of it, can maintain its standing, and secure its healthy growth.

Combination Towns the Worst Enemy.

A potent cause for the unfortunate condition I am now considering, is what is known as the "combination town," where the electric and gas undertakings are controlled in one interest. I feel tempted to say that the combination town is the worst enemy that gas lighting has. In the various combination towns, as they exist in different parts of the country, one of three different policies seems to control: (1) Either the combination company does not actively push either its gas or its electric business, on the ground that having only a limited sum to devote to canvassing, it pays best to spend this sum respectively on the fuel and power ends of its two lines, because no matter what kind of light the consumer may want, "we get it anyhow;" (2) or the company frankly pushes the sale of the electric light alone, alleging that a given sum spent in canvassing in the gas field yields a far larger return in the fuel end, than in the lighting end of the business; (3) or, finally, the company actively pushes both its electric and gas lighting, sending its canvassers out in competition, as though the two were operated separately. There can be little question as to which of these courses is the best from the viewpoint of the most extensive growth of artificial illumination. It is the demoralizing effect on the gas men operating under the first two conditions, and the enervating influence exerted by these men on their fellows in the business, which are deplored. Here are gas men, belonging to Gas Associations, and attending Gas Conventions, who frankly have no interest in gas lighting, or who are completely indifferent as to whether their consumers use gas light or electric light! Is it any wonder that indifference has reared its ugly head among us? When two natural competitors cease to compete, the general cause they both serve is bound to suffer.

But enough! Our catalogue of the ills under which modern gas lighting suffers is ended. It must needs be a robust child to bear up under so formidable an array of troubles. It is a child of sound constitution and tenacious vitality. Many of its infantile diseases have been weathered; some of the obstacles in its path are gradually becoming less formidable; some of the causes that have stunted its growth are in process of abatement. Conscious that it is doomed to maintain a life of struggle and competition, it still faces the future with a smile on its face, and with high hope in its heart. Let us, who have at heart the welfare and growth of artificial illumination, leave with it our best wishes.

MISCELLANEOUS NEWS.

MANCHESTER GAS-WORKS STATISTICS.

The financial history of the Manchester Corporation gas undertaking for the last twenty years is set out with great clearness on a large sheet printed in red and black, which is signed by Alderman Kay (the Chairman of the Gas Committee) and Mr. Frederick A. Price (the Superintendent of the Gas Department).

In 1897 there were 100,647 consumers, a number which has since grown to 192,886—showing an increase in the twenty years of 92,239. The gas-cookers in use have, of course, increased in a much greater proportion; the 4094 in use in the earlier year having since grown to 89,957. Gas-fires belonging to the Corporation were first put in use in 1912, when the total was 2319. This year the figure is practically ten times as large. The mileage of main-pipes has been extended from 750 to 994.

The quantity of coal carbonized in 1897 was 408,064 tons, with an output of gas of 4182 million c.ft. The latest figures are 502,377 tons of coal carbonized, with a make of 5902 million c.ft. of gas. The average price received for gas in the former year was 2s. 3·91d. per 1000 c.ft.; the corresponding figure for 1917 being 2s. 5·42d. As a matter of fact, for two years—1914-15—of the period the average price was just under 2s. per 1000 c.ft.

The manufacture of carburetted water gas was commenced in September, 1897; and sulphate of ammonia was first made at the Bradford Road station in April, 1902. Meter-rents outside the city were abolished in 1898; and in the following year the charge for gas supplied to the near and remote out-townships was made uniform. The charge for hire of gas-cookers within and outside the city was abolished in 1903; and the supply of high-pressure gas was commenced in 1910, about a year before gas-fires were first hired out.

The gross profit in 1897 was £119,223, and the net profit £86,070. This year there was a gross profit of £151,415, and a net profit of £93,781; the total net profit in the twenty years amounting to £2,316,425. A sum of £1,078,340 has been paid into the sinking fund, and £1,063,673 to the city fund for the relief of rates. Then there has been an amount of £255,557 applied to extension of works where borrowing powers were not granted, and to other purposes. The total value of property and assets was £2,072,837 in 1897, and is now £3,546,504. The liability (including mortgage debt) meanwhile increased only from £1,083,331 to £1,227,257. There is thus now an excess of assets over liabilities of £2,319,247.

HORLEY DISTRICT GAS COMPANY'S MEETING.

The Nomination of a Fifth Director.

The proceedings at the recent half-yearly meeting of the Horley District Gas Company were of a protracted character, owing to a long discussion with regard to the appointment of a fifth Director.

The report of the Directors for the six months ended June 30 expressed gratification that the statement of accounts permitted the payment of an increased dividend, and also the placing of £100 to the credit of the suspense account. The profit and loss account showed an available balance of £1414, after providing for the fixed charges; and the Directors recommended the payment of dividends at the rate of 5 p.ct. per annum on the preference stock, 5 p.ct. per annum on the "A" capital stock, and 3½ p.ct. per annum on the "B" capital stock (all less income-tax), which would leave a balance of £485 to be carried forward. In accordance with the Company's Act, the Directors thought it desirable that their number should be increased to five; and they nominated Mr. Frederick James Hazeldine to fill the seat on the Board. Mr. Hazeldine had for some years had experience in gas companies' administration, as a Director of the Godstone District Gas Company, and also of the Petersfield and Selsey Gas Company.

The Chairman (Mr. James Randall) having reviewed the position, a request was made by Mr. H. Mitchell that the minutes of the previous meeting should be read; and this having been done, Mr. A. E. Broadberry said that at the last meeting he asked if he would be in order in proposing that the number of Directors should be increased from four to five, and in nominating Mr. Mitchell as the fifth Director. The answer was in the affirmative; but there was no reference to this in the minutes read. Mr. Chance (representing the Company's Solicitors) remarked that though the matter was discussed it was abortive. Mr. Broadberry, however, pointed out that his proposal had now been acted upon; and he contended that reference to it should appear in the minutes. Mr. Mitchell supported this view; and Mr. Chance then undertook to draft a paragraph which should satisfy the meeting.

This matter adjusted, Mr. Mitchell asked why it was no mention was made of him in the report as a fifth Director, and what explanation the Board had to give for wilfully neglecting to report the wishes of the stockholders to their fellow stockholders. The Chairman said there was no desire on the part of the Board to do anything wrong. They simply took the matter into consideration. Mr. Hazeldine offered himself; and they considered him a desirable person to fill the post. He reminded the meeting that there was no restriction of time; and they did not know how many nominations might be made. Mr. Mitchell's nomination would be taken into consideration with any others that might be made. Mr. Mitchell said his nomination was sent in on May 30 and acknowledged. There was no reason why his name should not appear on the report as well as that of Mr. Hazeldine. The Board had acted in a misleading manner to the stockholders.

Following further discussion, the Chairman said the suggestion had been made that the business of the meeting, so far as regarded passing the report and increasing the number of Directors from four to five, should be carried out, and that the question of the appointment of a fifth Director should be adjourned to some period to be decided by the

meeting. In the interim, the Company should send out a circular to the shareholders intimating the facts. In the course of further debate, Mr. Percy Griffith said the suggestion seemed to meet the case admirably. Ultimately, the report and accounts were adopted, with the exception of the paragraph relating to the appointment of a fifth Director; the appointment of such Director being deferred to the next ordinary general meeting. The Chairman gave an assurance that the Directors would not send out any proxies; and Mr. Hazeldine said it would be grossly unfair not to do so. Country stockholders should be considered.

The meeting closed with a vote of thanks to the Chairman and Directors.

SOUTH SUBURBAN GAS COMPANY'S STAFF.

The Work of a Travelling Medical Board.

The Lewisham Tribunal on Monday last week resumed consideration of the application of the South Suburban Gas Company for three members of its staff—C. Ashley (31), ledger clack; R. J. Fowler (29), ledger clerk; and W. J. R. Cooper (27), chief wages clerk. All three had been rejected on offering themselves for voluntary enlistment; and on May 30 claims which had been put in for them were withdrawn, certificates having been granted by the Munitions Area Recruiting Officer. A Travelling Medical Board which sat at the Lewisham Town Hall passed them Class A; and the certificates having been withdrawn, application was made to the Tribunal, the Company appealing on the ground of national importance and the employees for health reasons. The Tribunal on the 10th inst. referred the cases to the Whitehall Medical Board for re-examination; and it was now reported that Ashley and Fowler had been passed B 2, and Cooper C 3.

The MILITARY REPRESENTATIVE (Mr. H. E. Harry) said he should not, in the circumstances, oppose four months' conditional exemption.

The CHAIRMAN (Mr. F. Mead) wished to ask, not for the purpose of raising a discussion but for his own information, what was the process of depriving these men of the protection cards which had been granted to them.

Mr. WILFRED WASTELL (the Secretary of the Company) said yellow cards were sent—the Munitions Area Recruiting Officer stating that instructions had been given for a female substitute to be provided through the employment exchange.

Mr. HARRY: The certificates were withdrawn because these were found to be A men.

The CHAIRMAN: Yes; the card reads: "The man named below has been found fit for general service. (To Mr. Wastell:) I think you were premature, as the certificates were still in existence.

Mr. WASTELL: I referred to Mr. Shuter (the Tribunal Clerk).

The CHAIRMAN: But they have still their cards.

Mr. WASTELL: For what they are worth! They have had their calling-up notices.

The CLERK: And that was an intimation that the protection card was withdrawn.

Four months' grace was granted in each case—subject to the usual condition.

Mr. WASTELL said all three men were special constables.

THE RECENT STRIKE AT DONCASTER.

Further information now to hand regarding the short strike (which lasted only two-and-a-quarter days) at Doncaster of members of the National Amalgamated Union of Labour, shows that the Special Committee of the Corporation, at their meeting last Thursday week, received an intimation from the Ministry of Munitions that, unless the men returned to work that day, the arbitration proceedings, which were to take place before the Committee on Production the following day in London, could not proceed; it being a rule that such arbitrations are not dealt with while the men are out. The Committee took this point into careful consideration, and also had an interview with the representative of the Ministry of Munitions who had seen the representatives of the Union. Ultimately it was decided (though it is believed by only a narrow majority) that, under the circumstances, rather than have the arbitration proceedings postponed, the men should be allowed to return to work forthwith. The men then held a meeting, and decided to go in.

The number of volunteers at the gas-works had increased on the Thursday; and these workers were kept to their duties till 10 o'clock that night, when they were relieved by the regular employees who had been on strike. The public were pleased to know that the gas workers were back; for the supply of gas had been steadily but surely failing, and it was obvious that unless a much greater number of volunteers were immediately forthcoming the supply would give out. Friday morning saw the whole of the men in the various departments back at their daily tasks.

Upon the arbitration award depends entirely whether the men will receive the 1s. per day extra which they are claiming. The arbitration was conducted before a court, of which Mr. W. W. M'Kenzie, K.C., was Chairman. The case for the Corporation was conducted by the Town Clerk (Mr. R. A. H. Tovey).

When the strikers marched out, the Gas Engineer and Manager (Mr. Robert Watson) was left with his Assistant (Mr. H. J. Carpenter), three foremen, a deputy foreman, Mr. G. Twist, and Mr. W. H. Turner (chief clerk). These, together with Mr. Cundey and Mr. Tully (contractor), rendered invaluable help in keeping things going.

Reduction in Price by the Hornsey Gas Company.—It is announced that from the taking of the meter indexes for the quarter ended June last, the price of gas will be reduced in Hornsey by 2d. per 1000 c.ft.—viz., from 3s. 1d. to 2s. 11d. The price of gas supplied through prepayment meters will also be reduced by 2d. per 1000 c.ft.

STOCKPORT GAS ENGINEER'S REPORT.

In his report to the Stockport Gas Committee for the year ended March 31 last, Mr. S. Meunier (the Engineer and Manager) says that the unfortunate conditions existing twelve months before continued throughout the past year, and were even accentuated during the winter months. The effect upon the revenue may be judged by the following figures, showing what would have resulted if it had been possible to efficiently man the whole of the coal-gas plant available and ready, and thereby reduce the amount of carburetted water gas that was required during the winter months in order to maintain supplies to the district. The total quantity of carburetted water gas made during the year represented the equivalent of 13,100 tons of coal, the residuals from which would amount roundly to 6550 tons of coke, 1000 tons of tar, and 1250 tons of ammoniacal liquor. Taking further into consideration that coke had to be used in this plant to the extent of 5500 tons, it may be reckoned that the cost of the additional coal would have been more than covered by the receipts from residuals; while, though the quantity of oil used per 1000 c.ft. of gas made was reduced as much as possible, it cost £2590 more than for the year 1915-16.

Turning to the accounts, the revenue from gas was £2349 less than for the previous year—no doubt due to the additional lighting restrictions, and the earlier closing of shops. Coke brought in an additional amount of £9485, for an increase in sales of 3572 tons. Tar prices ruled low at the commencement of the year, but gradually improved, though to nothing like the same extent as before the war; the export of pitch having been stopped by the Government, and there being only a limited demand for it on the home market. Ammoniacal liquor brought in £168 less, for about 382 tons smaller sale. Spent oxide, which was an exceptionally valuable source of revenue the previous year, shows a reduction now of £2113, due not so much to a great drop in the value per unit of sulphur as to the fact that stocks were not sufficiently charged to be available for sale. A new item, crude benzol, appears in this year's accounts, and amounts to £616. This process, as in many other gas-works, was installed at the request of the Government. The total increase in revenue from residuals is £7559; and the net increase from all sources is £5076.

On the expenditure side, coal cost £8376 more, cartage £1229, wages £15,684, and materials £1066; while there has been a small reduction on purification, brought about by a slight modification in working. Coal-gas manufacture shows a total increased cost of £11,946. The carburetted water-gas manufacture increase amounts to £2797, made up of oil £2590, and coke £342. Wages are £135 less, due to the plant being closed during the summer to save oil.

Maintenance, owing to increased wages, cost of materials, &c., is up £3639, though every effort was made to carry out only such repairs as were absolutely necessary. For public lamps, the revenue during the year was £2231 down. Rates and taxes have gone up from £10,489 to £14,417, or an increase of £3928.

The total additional expenditure amounts to £23,087. For the first time in the history of the undertaking a loss on working has to be recorded, amounting to £4432; and though this experience is also that of many others throughout the country, yet it is felt that, had all the assistance needed to meet the trying war conditions been fully and energetically given, not only by many Government Departments, but on every side, the balance, however small, could have been kept on the right side of the ledger.

The liquor concentration plant was got to work at the end of the financial year, and is operating very satisfactorily—there having been no difficulty so far in complying with the Government requirements. The difficulty of obtaining sufficient and reliable labour has not yet been solved; and efforts to obtain the return of such of the men who have been relegated from the front to substitution classes for munition work have met with little success, but are still being maintained.

The quantity of gas made during the year, as shown by the comparative statements, was 834,271,000 c.ft., as against 889,808,000 c.ft. the previous year. The make per ton increased from 11,165 to 11,577 c.ft.; while the leakage fell from 10·19 to 8·42 p.ct. From the September quarter the price of gas was increased 6d. per 1000 c.ft.

SUNDAY LABOUR AT THE STOCKPORT GAS-WORKS.

Thirty-Six Stokers before the Munitions Tribunal.

There is every prospect of a settlement of the dispute which has arisen between the Stockport Corporation gas stokers and the Gas Committee, arising out of the recent award of the Board of Trade Arbitrator (His Honour Judge Willis, K.C.). The circumstances of the trouble have been reported in previous issues of the "JOURNAL" [*ante*, pp. 242, 290, 386].

Thirty-six of the men who recently declined to work two separate eight-hour shifts on Sunday, Sept. 2, were summoned before the General Munitions Tribunal at the Manchester Town Hall last Thursday—Mr. A. J. Ashton, K.C., Recorder of the City, presiding—for absenting themselves from duty, and taking part in the strike before the points of difference had been laid before the Board of Trade.

Mr. Walter Cobbett represented the defendants, most of whom are members of the Municipal Employees' Association. Mr. W. Hyde, the Town Clerk of Stockport, appeared for the prosecution.

In applying for an adjournment of the cases, Mr. Cobbett said the point at issue raised the important question whether Sunday labour was compulsory. Some time ago, the men were awarded a bonus of 12s. a week for those receiving 30s. a week, and 6s. for those receiving 40s. and upwards; and on the men's application the award was subsequently varied by reducing the number of shifts from seven to six a week. The stokers afterwards asked for an additional 2s. a shift, with time-and-a-half pay for the hours between noon and midnight on Saturday, and double pay for Sunday work. This was refused. There were also one or two grievances which led to rather bitter disputes. The view taken by the men was that when it became a question of

stopping part of their bonus because they had not worked a whole week, Sunday was reckoned against them; and if they did not work on Sunday, then their bonus was stopped. The men's contention was that their week should be one of six days and not seven. Another question which was still outstanding was that of ventilation. He suggested that the summonses should be adjourned, and that such of the outstanding points of difference which were not being dealt with at a private conference or the impending Board of Trade inquiry (at which the defendants would be represented by the General Secretary of their Union, Mr. P. J. Tevenan), might be dealt with by the Chairman himself.

The Chairman hinted that, as he is a Board of Trade Arbitrator in connection with Wages Awards, the parties might ask the Chief Industrial Commissioner (Sir Geo. R. Askwith) whether he should arbitrate on the matters in dispute.

Mr. Hyde pointed out that the difference all arose through the Corporation applying the terms of the award under agreements made years ago. Sunday labour was absolutely essential at Stockport Gas-Works. The Gas Committee had, however, always been perfectly willing that any differences should be settled in accordance with the conditions in which they and the men worked. The Gas Committee had always complied with the terms of awards and agreements. They were quite willing that the differences should be settled in the way indicated; but he thought it should be understood that the men would, in the meantime, proceed with their work. They had handed in their notices and ceased their work the previous evening (Wednesday).

In answer to the Chairman, Mr. Hyde said the view he took was that the notices tendered by the men should be withdrawn by them, and that, if there was an adjournment, the men should undertake to be at their work on Sunday.

After further argument, Mr. Cobbett gave an undertaking that the men would return to work at 6 o'clock on Friday morning; and he took it that they would work on Sundays just as usual until the question had been disposed of.

The summonses were adjourned until to-morrow (Wednesday); and a conference between the parties was arranged to be held at the Stockport Town Hall yesterday (Monday) afternoon.

QUALITY OF GAS IN WAR TIME.

A Complaint as to Lack of Protection.

A correspondent writing to the "Daily Telegraph" on the subject of the quality of coal gas at present being supplied, makes the following remarks.

Since the war, an order has been issued that the higher benzenes were to be extracted, for the purpose of making explosives, before the gas was passed to the public. The local authorities were instructed that they should no longer test the gas from time to time for illuminating power, as this could not come up to the standard after the removal of the substances rich in carbon. It appears that in many districts the local authorities have neglected to protect the consumer by insisting that the heating power, at any rate, should be kept at, or near to, the original standard. That is why the amount of inert gas in the gas supplied has in some districts risen to as much as 30 p.ct. The proof of this is that in other districts the inert gas is only 10 p.ct.

The public have received no protection; and as a result the cost of doing work by gas, whether it be power production, lighting by incandescent mantles, heating, or cooking, has greatly increased. I find that, while the nominal price of gas per 1000 c.ft. remained the same, the actual cost of doing the same work was 75 p.ct. more during the first half of this year, as compared with the same period in 1915; the reason being that a far greater volume of gas had to be used, as it was so poor. At times also the pressure has been low; so one did not get the same mass of gas in 1000 c.ft. Now the Company have raised the nominal charge for gas by 17 p.ct. No doubt it was necessary to remove the higher benzenes; but the matter was conducted with complete disregard for the interests of the public. No notice was given, so that ordinary persons could understand that the new gas would not be such good value for money. No advice was issued to the effect that this poor gas would need a much smaller volume of air added to it for its economical combustion, and that, therefore, the air-holes in atmospheric burners, gas-cookers, &c., should be to a large extent reduced by plugs. As a result of this neglect, a large quantity of gas has been wasted in heating a surplus supply of cold air, and gas bills have increased to a serious extent. It is not much use for the Minister of Munitions to request all persons who possibly can do so to use gas instead of other fuel, when complaints about high gas bills are general. Of course, one expects to pay more for gas, but 75 p.ct. extra or more, as it will be with the 17 p.ct. rise in nominal price, is serious.

I am bringing this matter forward because it seems important, in view of the difficulty many have in paying their way at the present time. It is not a very large house that has a gas bill of £12 a year in normal times. If this is doubled, it means the payment of an extra quarter's rent per annum.

In conclusion, the correspondent states his belief that a large proportion of the loss of money and gas that has occurred and is occurring—in spite of the ever-insistent demands for economy—would have been avoided had the authorities troubled to pay proper attention to this matter and to have explained the position to the public.

Stanton Ironworks Company, Ltd.—With a view to centralizing their business in London, the Stanton Company are removing their office, on Oct. 1 from No. 44, Coal Exchange, to Maxwell House, Arundel Street, Strand, W.C.2. Their new telegraphic address will be "Cobbles Eastrand London," and the telephone number "Central 6808." Mr. Arnold Longden, who has represented the Company for some years on the London Coal Exchange, will continue to supervise the Company's interests at Maxwell House.

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MAINTENANCE OF GAS-LAMPS IN RESIDENCES.

Among the papers prepared for this year's "Correspondence Convention" of the American Illuminating Society was one by Mr. E. B. MYERS, on "The Growth and Present Status of Systems Used in the Maintenance of Gas-Lamps in Residences."

The paper pointed out that for some time the majority of the gas companies throughout the country have had in effect well-organized systems for the maintenance of gas-lamps in commercial establishments; and these lamps under maintenance have given better service than those not under maintenance. How much good is accomplished by systematic maintenance has been clearly shown, he says, by a recent lengthy and thorough investigation made by the National Bureau of Standards. The investigation was extended over ten large cities in the States, and consisted in the examination of thousands of gas-lamps in commercial establishments, some of which were under maintenance and some of which were not. The investigation emphasized the common troubles which might be expected to be found with gas-lamps not under maintenance, and brought out clearly how proper maintenance had been effective in keeping other gas-lamps in good condition.

A variety of schemes has been tried by different gas companies in maintaining gas-lighting equipments in commercial establishments. These systems have met with varied success; but, naturally, those meeting with the least success have been eliminated, until now there seems to be one system generally used for this work. Customers may receive the service maintaining the lamps in good condition, including cleaning glassware, making the necessary adjustments, and supplying all repair parts, such as mantles, glassware, &c. It has been found, by experience, that calls made about every ten days are sufficient to keep the lamps in good condition; but, of course, additional calls are made where the case demands it. The work is handled by a corps of men under the direct charge of inspectors—men are primarily expert lamp men and in no sense acting as salesmen. They carry with them a sufficient supply of mantles, repair parts, &c., in addition to the necessary cleaning materials. The charges made for this maintenance depend upon the type of lamp, and vary with the number of mantles per lamp.

The beneficial results obtained by the systematic maintenance of gas-lamps in commercial establishments appealed so strongly to some gas companies that maintenance of some sort was extended to cover lamps in residences; and the results have been no less gratifying. It is noted that schemes for the maintenance of residence lamps installed in different cities, while having the same object in view, must be worked out along different lines.

The earliest attempt to pay special attention to the maintenance of illuminating appliances in the home was simply to extend somewhat the scope of the complaint work already being done by the distribution department of many gas companies. This resulted in what is called "Request Maintenance." By sending the request to the gas company, any consumer could have a man call who would make any or all necessary lamp adjustments free of charge. If any material—such as globes, mantles, or lamp parts—was necessary, it was charged at regular prices. In other words, upon request, labour was supplied free of charge, the only cost to the consumer being for material.

It was soon found, however, that lamps in residences were in little better shape than before. The average customer would not avail himself of the facilities offered. He would probably first endure, and then become accustomed to, poor lighting conditions rather than immediately make the request upon the gas company. It was realized before long that, to make the maintenance scheme effective, it was necessary to take the matter out of the hands of the customer, and have the inspection, adjustment, or repairs made regularly and automatically.

Probably the earliest attempt to put into effect such an automatic system was made at Toronto (Canada), and it has therefore been called the Toronto plan. In this plan, the gas company makes a house-to-house canvass of the city; so that each home is reached three times a year. By this means, every gas-lamp in every residence is examined and adjusted, and the glassware cleaned. There is no charge to the customer for this work. Should it be necessary to replace broken mantles, broken glassware, or other lamp parts, the work is done then and there by the inspector, who carries a stock of replacements in a well-equipped kit. The articles are supplied and installed at regular prices, but no charge is made for the labour.

These inspectors are experienced men, carefully selected for their work. They are familiar with the disadvantages incidental to the use of antiquated, cheap, or inefficient lamps, and are able to make suggestions resulting in the improvement of the illumination—often, at the same time, decreasing the operating cost. For example, a customer is advised to replace open-flame burners with modern incandescent gas-lamps. Where modern lamps are so placed that the illumination is improperly applied, changes are suggested which result in the proper application. Suggestions are made leading to the installation of proper shades or globes, tending to reduce otherwise high intrinsic brilliancy, with the elimination of glare.

Where, for any reason the illumination has decreased gradually, the householder might not become aware of this condition because of the gradualness of the change. Moreover, should one of several gas-lamps become inoperative where all are necessary for adequate illumination, the condition might be endured because of lack of initiative on the part of the householder. When the inspector brings these points to his attention, the conditions are often remedied.

The object of these regular maintenance systems is to anticipate complaints on gas-lighting equipment, and thus insure to the customers continued proper illumination throughout the house. Moreover, these results can be obtained at no relatively high expense. It has been found that in operating the Toronto scheme, the profit made on the sale by the inspector of new lamps, lamp parts, or mantles, considerably reduces the cost to the gas company. This cost is further de-

ON

WAR SERVICE

¶ Though close preoccupation on urgent War Work has necessarily restricted the output of Davis Stoves for domestic use, every effort is being made to cope with the present demand.

¶ Each individual order is receiving all the attention possible under the present difficult circumstances.

The Davis Gas Stove Co., Ltd., 60, Oxford St., London, W.1.

creased if there is taken into consideration the fact that complaint work is often attended to by the inspector on the job which would otherwise have to be attended to by another gas company employee sent on a special visit. Then, too, when the maintenance system is in operation, the cost of ordinary complaint work (ordinarily done free by gas companies) on incandescent lamps is considerably lower than would be the case if the maintenance system were not in force.

Numerous gas companies have adopted the Toronto plan, or similar plans with slight variations. Equally good results have been obtained; and it is claimed that visits made three times each year are sufficient to keep the lighting equipments in the best of condition.

In some localities, it has been thought well to put into effect a somewhat different plan—called the Chicago plan, because of its origination in that city. It is a selective plan; and those customers who signify their desire for the service sign a contract by which lamps are maintained at the rate of 10 c. per lamp per month. Each lamp on maintenance is visited once per month, and is therefore kept in perfect condition. New mantles, lamp parts, or glassware, are supplied at no further expense to the customer. The advocates of this plan are enthusiastic over the results obtained; but it has the disadvantage that all lighting equipments throughout the city are not visited regularly, as in the case of the Toronto plan. In one city using a scheme similar to the Chicago plan, this disadvantage has been recognized, and they have installed an additional maintenance scheme by means of which a house-to-house canvass is made each fall, and every gas-lighting equipment in the city is put in perfect condition—the customer being charged only for the material used.

Gas companies have long been of the opinion, and now the investigations of the Bureau of Standards have proved the fact, that gas-lighting equipments maintained by the customer are not maintained at all; and the author emphasizes a statement made by the Bureau of Standards, as one of the conclusions of their report: "When one recognizes the great advantages of maintenance to both company and customer, it seems that it would be desirable to have this service rendered to all users of gas for lighting."

A canvass of the gas companies of the States, which has just been completed, shows that more and more interest is being given by them to this subject of the maintenance of gas-lighting equipment in the home. In fact, in a large number of cities, residential maintenance systems are now being operated, and in many other cities such systems are in process of being worked-out. The writer of the paper, in conclusion, expresses the hope that all gas companies will take steps to keep gas-lighting equipments in the home in good condition by the prompt installation of systematic maintenance schemes.

A Local Government Board inquiry has been held at Roscrea (co. Tipperary), with regard to the District Council's application for powers to enable them to supply gas or other form of illuminant for public purposes in the town of Borris-in-Ossory.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Sept.* 24.

The demand for pitch is well maintained, and further sales are reported. Shipments are in full swing, and the position of the article is quite firm. Makers' price is not below 45s. per ton net in bulk f.o.b. works for export. Solvent naphtha is in great request, and the price is firmer at about 2s. 5d. to 2s. 6d. per gallon net and naked at makers' works. In other products, there is no change to record.

The demand continues for sulphate of ammonia for agricultural purposes, and a large amount of business is being done on Government terms.

Tar Products in the Provinces.

Sept. 24.

The average values for gas-works products during the week were: Gas-works coal tar, 23s. 3d. to 27s. 3d. Pitch, East Coast, 17s. to 18s. per ton; West Coast—Manchester 17s. 6d. to 18s. 6d., Liverpool 17s. 6d. to 18s. 6d., Clyde 18s. to 19s. nominal. Benzol, 90 p.ct., North 10¼d. to 11¼d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6¼d. to 6¾d. Solvent naphtha, naked, North, 2s. to 2s. 1d. Heavy naphtha, North, 1s. 1d. to 1s. 2d. Creosote, in bulk, North, 3¼d. to 3⅜d. Heavy oils, in bulk, North, 3⅜d. to 4¼d. Carbolic acid, 60 p.ct., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1¼d. to 2d.

FROM A MARKET CORRESPONDENT.

Tar Products.

The feature of the market during the past week has been the continued and increasing demand in all centres for solvent naphtha, which has been quoted at up to 2s. 8d. per gallon, with every prospect of a further advance. The interesting explanation is put forward that the demand is due to the efforts being made to utilize this product more freely as a motor spirit. The demand for pitch for export to the Continent is still as strong as ever, and 48s. per ton f.o.b. London remains the average price at which these orders are taken. Shipping facilities in London are fairly good, but are not sufficient for the business offered. The Provinces still have to mark time, as no facilities appear to be available; and as the season of heavy production is almost at hand, stocks are accumulating. Nevertheless, provincial holders, in view of the London shipping position, are unwilling to accept the current local quotations unless they are absolutely forced to sell. Cresylic acid maintains the improving tendency noted during the last two weeks, and sellers are asking 2s. 6d. per gallon. In naphthalenes, the refined is dearer. Among crudes, which range from £5 to £14

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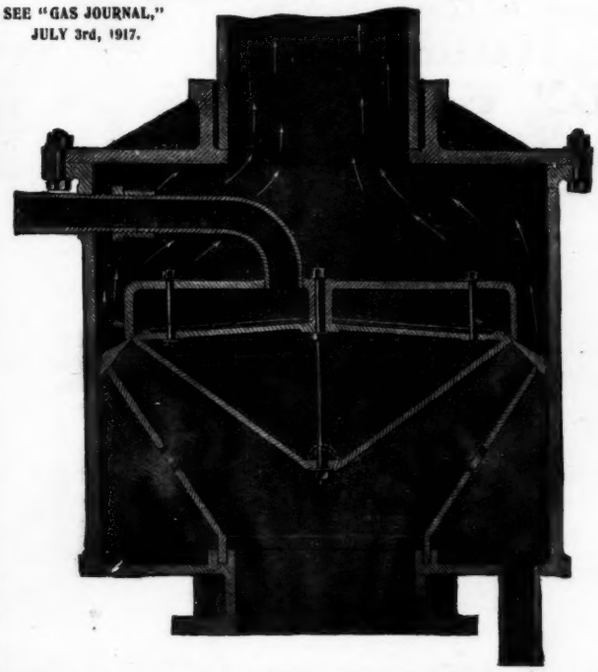

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per ton, the cheaper sorts are difficult to procure. There is practically no business in creosote, apart from the requirements of the Government; and the market is still awaiting some official announcement regarding the price for supplies taken over. Aniline oil remains quiet, and carbolic acid steady—crystals being rarely mentioned. Other products are unchanged. The range of quotations is as follows:

Aniline Oil (pure): 1s. 3d. per lb.

Benzol: 90% London, 1s. 0½d., North 10½d. to 11½d.; 50% North 1s. 3½d. to 1s. 4½d. haked per gallon.

Carbolic Acid: 60% East and West Coast 3s. 6d. per gallon; crystals 40%, 1s. 3d. per lb.

Crude Tar: London 30s., Midlands 24s. to 25s.; North 24s. 6d. per ton, *ex* works.

Pitch: London 48s. f.o.b.; East Coast, 18s. to 20s. f.o.b.; West Coast—Liverpool and Manchester 18s. 6d. to 19s. 6d. f.a.s., Clyde 20s. per ton.

Solvent Naphtha: Naked London 90-190% 1s. 8d. to 1s. 9d.; North 1s. 3d. to 1s. 4d. per gallon; 90-160% naked London 2s. 5d. to 2s. 8d.; North 2s. 3d. per gallon.

Crude Naphtha: Naked 30% 8½d. to 8¾d.; North 6½d. to 6¾d.

Naphthalene: Refined £30 to £32 10s.; salts 80s., bags included.

Toluol: Naked, London 2s. 4d.; North 2s. 3d.

Creosote: Nominal, London 4¼d.; North 3¾d.; heavy oil, 4¼d. per gallon in bulk.

Anthracene: "A" quality, 40-45%, 4½d. per unit; "B" quality, 1¾d. to 2¼d.

Cresylic Acid: 95%, 2s. 5d.; 97-99%, 2s. 6d. to 2s. 7d.; Glasgow 2s. 3d., *ex* works London and f.o.b. other ports.

Grease Oils 18° Tw. (naked), £6 per ton f.o.r. makers' works.

Sulphate of Ammonia.

Trade here keeps good. Sellers do not seem very anxious to deliver just now, and prefer to wait the advance in the official quotation next month. This same factor is bringing in a number of heavy orders on behalf of the home agriculturist. It has been suggested in some quarters that the production of sulphate will be insufficient to satisfy the home trade in the coming season; but it is difficult to see any justification for such an anticipation. The licences for export are being reduced still further this month. Probably the amount exported will be less than half the quantity allowed to leave the country last month; and it may be taken for granted that the Government will not permit any shortage to occur. From a national point of view, the policy of looking after the home agriculturist, in preference to catering for the demands of the export trade, is probably a wise one at the present time; but looking further ahead, there are considerable difficulties to be surmounted in the way of recovering the export trade now being lost. And, truth to tell, the manufacturer, unless he is prepared to come out wholeheartedly for educational propaganda in the countries of former large customers as well as among the farmers at home, looks like paying the penalty of his indifference to the trade in general before the war.

Quotations (basis 25 p.ct., double bags): Home trade: September, £15 7s. 6d.; October-December, £15 15s.; January-May, 1918, £16 7s. 6d.—all delivered, less 10s. per ton at makers' works.

Export (under licence only): London, Leith, Liverpool, and Hull, £23 10s. to £24 10s. f.o.b.

Name of the North British Association.—Attention is drawn by Mr. James D. Keillor, of Hawick, to the fact that what he is reported on p. 514 of the "JOURNAL" to have said in connection with the proposed change of name of the North British Association of Gas Managers is not exactly what he did say, which was: "That a recommendation go from this meeting to-day to the Institution of Gas Engineers that it change its name to (say) the Institution of British Gas Engineers and Managers, with a view to the standardizing, or the forming of one grand British gas organization; and with the view to centralizing their organization, and uniting the forces of gas, let us adopt a name such as the Institution of British Gas Engineers and Managers—North British Section, or Scottish Section."

Tamworth Gas Light and Coke Company.—At the annual meeting of the Company (Dr. M. Sculthorpe in the chair), the statement of accounts for the year ended June 30 showed a surplus on the year's working of £2298. The Directors in their report stated that, as the result of the continued increased restrictions in public and private lighting, combined with the earlier introduction of "Daylight Saving," the consumption of gas had further decreased by 3,245,000 c.ft. during the year. The Chairman, in moving the adoption of the report and accounts, said the usual dividend would be paid, although the Company had recently spent £200 in laying down a toluol plant. Out of toluol they were not getting any profit, and they regarded it as the Company's contribution to the prosecution of the war. He explained that they were now supplying gas for motor power, to take the place of petrol. The report and accounts were adopted. The usual dividend of 10 p.ct. on the old shares and 7 p.ct. on the new shares was declared—the same percentage as in previous years.

Gas Workers and Leaving Certificates.—At a General Munitions Tribunal at Leeds, on Wednesday last, the Cleckheaton District Council Gas Department, through their Engineer (Mr. A. L. Jennings), complained that Messrs. Cooke, Sons, & Co., Ltd., had given employment to Sam Phillips, who within six weeks past had been engaged at the gas-works (a controlled establishment), without demanding the production of a leaving certificate. On entering the gas-works, the man had signed an agreement to secure a leaving certificate before going to other employment. He complained of unfitness for his work after a fortnight, and was advised to see a doctor, whose fee would be paid by the department. He became abusive, and threw down his tools and left. The defendants said they had no idea he had been on munition work until a letter came from the gas-works, when they told Phillips he had better go and do his duty. The defendants were ordered to pay £1 and £1 11s. 6d. costs.

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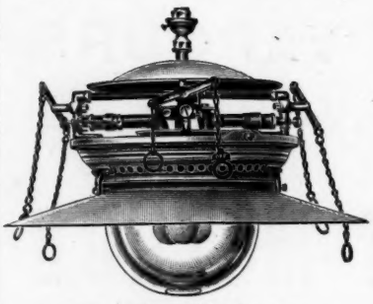

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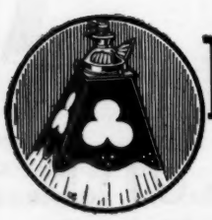

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COAL TRADE REPORT.

Northern Coal Trade.

The coal trade is still irregular; but the output is rather larger, and is, on the whole, better taken up than it was. In steam coal, the demand is higher for the better qualities. Best Northumbrian steams are firm at 30s. per ton f.o.b.; second-class descriptions are quiet at about 25s. 6d.; and there is an abundance of small steams at from 18s. 6d. to 20s. 6d. In gas coal, the demand is full for best kinds, and increasing for the other classes. Best Durham gas coals are firm at 25s. f.o.b.; second-class qualities are 23s. 6d.; and "Wear Specials" are from 27s. to 30s., with a strong inquiry. The output is fair for the season; but the "control" is still felt a little in the diversion of trade. The high freights have some effect; Tyne to London, gas coal, being at the high rate of 19s. 6d. to 20s. Home consumption of gas coal is now steadily increasing week by week, and, generally speaking, Durham coal is in demand full enough to give the collieries steady work. Coke is fairly firm; good gas coke being from 30s. to 32s. per ton f.o.b. Stocks are rather heavier at some of the inland gas-works. More is being exported in other cases; but steamers are scarce, and the freights are based on 45s. to Dunkirk and neighbouring ports.

Price of Gas at Whittington.—The Whittington Gas Company (Derbyshire) have given notice that, owing to the increased cost of coal, materials, and labour, they are compelled to increase the price of gas as from Sept. 29. The price of gas supplied by ordinary meters for lighting, heating, cooking, and for manufacturing purposes will be raised by 3d. per 1000 c.ft. For prepayment meters, the discount of 1d. per 1000 c.ft. will be discontinued.

Brighouse Wages Question.—The Board of Trade arbitrator's award, in the application of the Brighouse Corporation employees for more pay, having been that the wages should remain at the existing standard, the employees, through the Workers' Union, only a fort-night after the announcement of the award, have put forward a claim that the pay should be increased by no less than 15s. per week. In the circumstances, the Corporation have decided to do nothing but forward the correspondence to the Chief Industrial Commissioner.

Meter-Maker's Patriotic Desire.—At a meeting of a Munitions Tribunal in London, an appeal to be placed on more direct munition work was made by a man who said he had been working for eighteen years for a firm of gas-meter manufacturers. Though it was a good job, he felt he could not remain making gas-meters when aeroplane manufacturers so badly wanted men of his type. Money had nothing to do with the appeal, which was a matter of conscience. The Chair-man assured the applicant that making gas-meters was munition work. The firm's representative said the contracts were urgent, and the man could not be spared. He was, however, sincere in what he asked for; and if he stayed, the firm would place him on work which would appeal to him as more direct war work. Applicant agreed to return.

Wandsworth Company's Increase in Price.—The Wandsworth, Wimbledon, and Epsom District Gas Company announce that the price of gas will be raised as from the Michaelmas quarter as follows: Wandsworth area, 2s. 6d. to 2s. 10d. per 1000 c.ft.; Wimbledon, 3s. 1d. to 3s. 5d.; Epsom, 3s. 6d. to 3s. 10d. The Company state that the increase is rendered necessary by war conditions, including a great advance in freights, higher cost of materials, and war bonuses.

Gas-Driven Vehicles and an Alleged Nuisance.—Ratepayers and residents of the Marine Avenue, Westcliff, have been petitioning the Southend Corporation about an alleged nuisance, which they complain arises in connection with the supply of coal gas to hackney motor vehicles at certain premises in that thoroughfare, and about the risk of fire and explosion. The Health Committee had a report from the Medical Officer on the subject; and as a consequence, express satisfac-tion that no danger to health exists in connection with the supply of gas to the vehicles. Inasmuch as the matters complained of are not such as to constitute a nuisance under the Public Health Acts, the Town Clerk has been instructed to so inform the residents. Never-theless, the matter has been referred to the Watch Committee.

Increase in Price at Smethwick.—In view of the great increase in the estimated expenditure for coal, wages, and other items for the current year, the Smethwick Gas Committee have decided that the price of gas for motive power and manufacturing purposes shall be in-creased from Sept. 30 as follows: For quantities up to 3,000,000 c.ft., 2s. 2d. per quarter per 1000 c.ft.; for quantities over 3,000,000 c.ft., 2s. per quarter per 1000 c.ft., less 5 p.ct. discount for prompt payment. The existing prices, which averaged 1s. 8d. per 1000 c.ft., have been insufficient to cover the actual cost. It is not proposed at present to alter the prices for lighting and domestic purposes. The position in connection with the coal supplies is stated to be very unsatisfactory; and the Committee have found it necessary to use coal from stock. Strong representations have been made to the Coal Controller on the matter.

Reduction of Bonus without Consent.—At a General Munitions Tribunal at Halifax last Wednesday, the Campbell Gas-Engine Com-pany had to answer two summonses, alleging that they had reduced the bonus to labourers in their employ without the consent of the Ministry of Munitions. Mr. E. Booth, for the defence, applied for a month's adjournment, in order that Counsel might be instructed, and a thorough investigation arranged. The questions involved were of far-reaching importance, and had bearing on the relative remuneration of skilled and unskilled workers. The defendants had pointed out to the Ministry of Munitions that proceedings in the cases would be likely to cause a serious industrial upset; but the Ministry had decided not to withdraw the summonses. Mr. A. S. Comyn Carr, on behalf of the Ministry of Munitions, opposed adjournment, and said the reductions complained of occurred in February. The firm's attention was drawn to the matter; but they delayed replying until after the proceedings were commenced. The hearing was adjourned to Oct. 6.

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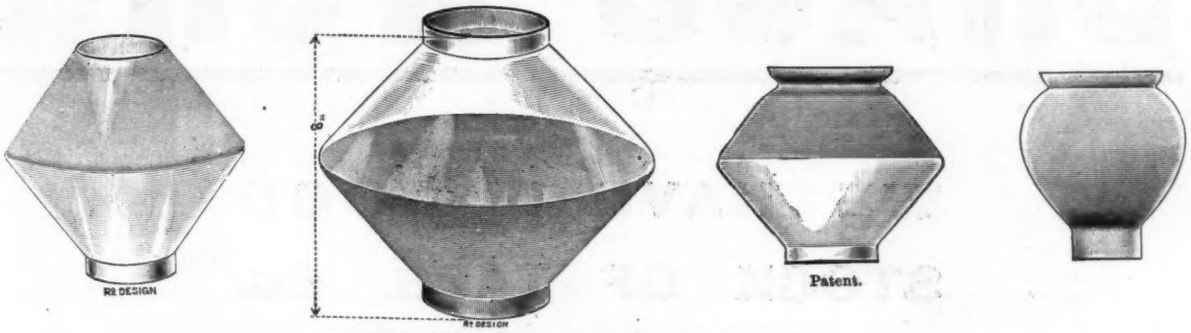

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Glass for 300-C.P. Petromax Lamps.

See Advertisement on facing page.

Wages at Burnley.

Recently there was a general concession of 9s. per week on pre-war rates to Burnley Corporation workers; and it is in regard to the interpretation of this award to gas workers that there was nearly a stoppage of the Burnley Corporation Gas-Works a fortnight since. Fortunately for the public, the men were got to postpone action for a week. Had they carried out their decision to "down tools," things in the town would have been serious, for the department has not sufficient storage capacity for one day's consumption of gas by the public. The Corporation, having in view the fact that gas workers normally worked seven shifts, decided to pay the Arbitrator's award of 9s. over and above the earnings for the seven shifts at pre-war rates. The men claim that the 9s. ought to be paid in respect of six days, and that for Sunday labour an extra bonus of 2s. 3d. should be paid, making a total of 11s. 3d. They arrive at the 2s. 3d. amount in the following manner: $\frac{1}{7}$th of 9s. is 1s. 6d., and Sunday labour reckoned as time-and-a-half accounts for 9d., making 2s. 3d. A special meeting of the Committee considered the letter of Mr. Burrows, the Secretary of the Gas Workers and General Labours' Union, and arranged for a joint meeting. The Gas Committee, it was explained, had no feeling in the matter, and were quite willing to take steps to obtain the opinion of the Arbitrator on the particular point raised by the gas workers. The men's representatives agreed, as stated above, to stay action for a week. Work proceeded as usual during the week-end; the men loyally carrying out the arrangement made with the Committee.

Automatic Lighting in Edinburgh.—Messrs. Alder and Mackay's "pressure-wave" system of lighting and extinguishing public lamps was tried in Edinburgh on a limited scale last winter, and was found successful. It is now intended to apply the system to an extended area in the same district. Every alternate lamp is to be fitted with the apparatus—making, with last year's 65 lamps, a total of 338. The lamps are to be extinguished at 10 o'clock.

Price of Gas at Maryport.—At the monthly meeting of the Maryport Urban District Council, Mr. R. W. Watson (the Chairman of the Gas Committee) gave notice of motion that the price of gas be increased 5d. per 1000 c.ft. At present it is 3s. 4d. He said this course had been rendered necessary by the losses of the last two years. They were still selling at pre-war rates. The Manager (Mr. A. T. Harris) had effected great economies, and, in spite of the higher price, saved £628 on the cost of coal used. If coal had remained at the same figure, the saving would have been £903. The yield per ton of coal was over 13,000 c.ft., against 11,000 c.ft. the previous year. Against this, they had to put a considerably increased cost for repairs, renewals, rent, rates, and taxes, and new plant paid out of revenue; and they showed a loss of £446 on the year's working. Had the works, however, been operated on the same lines as during the previous year, the loss would have been over £1000.

Suicide in a Gas-Oven.—The divorced wife of Mr. Huntley Wright (the actor), who had been employed as a clerk at the Ministry of Munitions, was found dead at her flat, with her head resting on a cushion inside the gas-oven. Medical evidence showed that she had suffered from alcohol and the morphia habit.

Sligo Gas Lighting.—The administration of municipal affairs in Sligo has recently been the subject of official investigation; and among other disclosures that followed, was one as to the non-payment to the local Gas Company of their account for public lighting. At a special meeting of the Corporation, when the matter was referred to, the Mayor (Mr. D. M. Hanley) said he supposed all they could do was to explain the position of affairs, and state that the Company would be paid as soon as possible. Meantime, it was decided that the usual winter lighting of the town should be proceeded with.

The Loss on the Goole Gas-Works.—The Goole Urban District Council have considered at a special meeting in committee the statement of accounts referred to on p. 526 of last week's issue, which showed a loss for the past year of £1576. It was reported that the Sub-Committee's recommendations regarding the works, on which there has been a loss of over £4000 in two years, had been received. This stated that, apart from the abnormal conditions prevailing, the present out-of-date plant was extravagant and wasteful, the cost of labour was high, and the present reduced staff could not be curtailed. There was a likelihood of a further decrease in the consumption of gas, owing to the restricted public lighting, the curtailment of shop hours, the increasing number of empty houses in the town, and the use of electric light. On the Sub-Committee's recommendation, it was decided to increase the price of gas from 3s. 9d. to 4s. per 1000 c.ft., and to reduce the candle power from 16$\frac{1}{2}$ to 15, which would be a further saving of 2d. per 1000 c.ft. The price of coke was advanced from 18s. 4d. to £1 per ton.

The Sheffield Gas-Works Explosion.—The inquest following on the fatality which resulted from the explosion on Aug. 27 at the Grimesthorpe works of the Sheffield United Gas Company, was concluded last Thursday [*ante*, p. 479]. It was stated that the deceased, Ernest Mottershead, a private in the working party of a Lancashire battalion, was working near the meter-house when the explosion occurred. Almost immediately two huge sheets of flame spurted forth and there was a second explosion. Workmen in other parts of the yard rushed to the spot, and saw three men crawling on their hands and knees through the flames. A valve-man named Joseph Allen said that he was in the meter-house three minutes before the explosion happened, and the place was then in order, and everything working all right. He had not got forty yards away when the accident happened. The meter-house was soon a mass of flame, and an adjacent holder was pierced by flying *débris* and set on fire. He went to assist in shutting off the gas. It was stated that the explosion was due either to an excess of gas causing too much pressure in the seal, or some unknown reason. A verdict of "Accidental death" was returned.

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Benzol Distribution After the War.

A good deal of uneasiness is, "says the "Glasgow Herald," being manifested in certain motoring quarters "regarding the utility of benzol as a competitive fuel against petrol when the whole output of the present war sources of supply shall become available after the war comes to an end. At the present time private users of motor spirit are in the hands, and at the mercy, of the importers, so far as prices are concerned. The importers are in a position to demand any price they think fit; and, so far as can be judged, the same condition of things will continue after the war, unless some competitive fuel comes to the rescue. This fuel motorists had begun to hope would be found in home-produced benzol. When war broke out, some 12,000,000 gallons of this spirit were distilled in the United Kingdom, chiefly as a bye-product of the manufacture of blast-furnace coke. But inasmuch as one of its constituents (toluol) is one of the ingredients used for high explosives, the Government have financed the erection of large works for the sole production of the spirit from coal; and at the present time the total output is said to reach not less than 40,000,000 gallons per annum. All benzol in the United Kingdom is now controlled by the Ministry of Munitions; and it is alleged that when peace returns Government control will be continued. Further, it is stated that arrangements have already been made whereby the output will be under the control of the Anglo-Persian Oil Company, in which the Government hold a controlling interest, and that its distribution will be in the hands of the British Petroleum Company, who will act in future as distributors for the Anglo-Persian output. In this arrangement the motoring fraternity see a malign attempt to place the competing fuel in the hands of the enemy. But it is not clear that any justification for this suspicion exists. The Directors of the Anglo-Persian Company are not in the petrol importing companies, as Directors at least; and the concerns in which they are interested—other than the Anglo-Persian—do not produce motor spirit to any extent. Moreover, the ultimate arbiter is the British Treasury."

Perils of Unlit Streets.—At last Tuesday's meeting of the Newton-le-Willows District Council it was announced that at a meeting of the representatives of the employees of the engineering works of Earlestown and Newton a resolution was passed, and a letter sent to the local police authorities, saying the men would refuse to go to work at nights unless some light was allowed in the streets, owing to the many serious accidents which occurred in the excessive darkness of last winter. The Lighting Committee of the Council passed a resolution authorizing the Gas Engineer to light a hundred street-lamps with tops darkened, and to let the police take proceedings if not satisfied.

Quality and Pressure of Gas.—The Town Clerk has reported to the Swansea Corporation with regard to the efforts made by him to obtain a Departmental Inquiry into the Gas (Standard of Calorific Power) Act, 1916. He read a letter from the Board of Trade intimating that the Board and other Government Departments concerned have requested the Fuel Research Board to conduct an investigation and inquiry, and to advise them as to what is the most suitable composition and quality of gas and the minimum pressure at which it should be generally supplied, having regard to the desirability of economy in the use of coal, the adequate recovery of bye-products, and the purposes for which gas is now used.

Coal Gas for Motors.—Last week's issue of "Light Car and Cycle Car" wrote: That the use of coal gas is making remarkable developments is visible to the eye in the number of vehicles now running on it. Less apparent, but none the less important, is the attention which is being bestowed upon the subject by gas undertakings, scientific institutions, and by private research. It is always unwise to forecast; but it really looks as if coal gas, far from proving merely a war-time expedient, has come to stay as a permanent fuel. Perhaps, after the war, instead of asking for a can of petrol, we shall have to choose between petrol, shale spirit, benzol, alcohol, or coal gas—for each of these various fuels is in a state of important development. A writer in the "Daily Chronicle" says: The car with coal gas as a motive power seems to be coming. It has been well and successfully tested in the warm summer days. But remember the chill of winter! No gas manufacturer has yet succeeded in eliminating naphthalene; it is always present. . . . How will the little inlet-pipe of the motor-engine fare when naphthalene dams it tight?

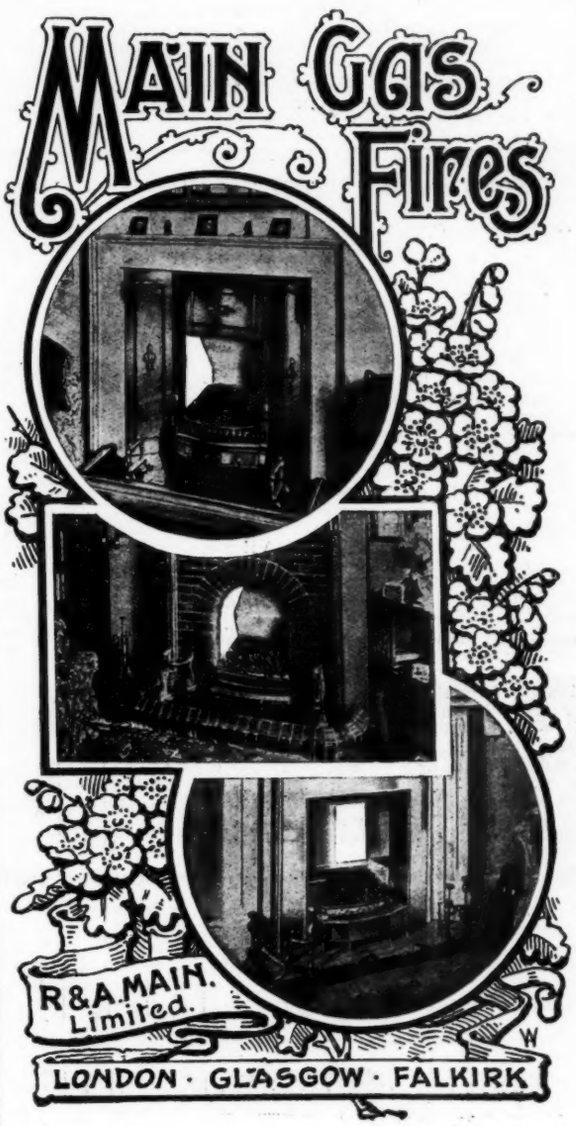
APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Sept. 19.]

Nos. 12,922—13,263.

DUERDEN, G. E.—"Gas-containers for motor-vehicle propulsion." No. 13,232.
FLETCHER, F. T.—"Generating illuminating-gas." No. 12,990.
HUMPHREY, A. H. "Gas-burners." Nos. 12,996, 12,997.
JAGGER, R. C.—"Gas-containers for motor-vehicles." No. 13,229.
KIRBY, A.—"Burners for pitch." No. 13,205.
LACROIX, P. A. M.—"Photometers." No. 12,976.
MOORE, A.—"Supporting and carrying gas bags or containers for motor-vehicles." No. 13,161.
RICHARD, J.—See Lacroix. No. 12,976.
SCOTT, W. C. H.—"Gas-container attachments for automobiles." No. 12,944.
SOUTH METROPOLITAN GAS COMPANY.—See Kirby. No. 13,205.
SPIVEY, F.—"Portable gasholder for use with motor-vehicles." No. 13,001.
TOMLINSON, J. D.—"Supporting and carrying gas bags or containers for motor-vehicles." No. 13,161.
TURNER, W. DE C.—"Gas-producer." No. 13,041.
WALLWIN, J. M.—"Mixing air and gas supplied under pressure." No. 13,125.
WILLIAMS, P. F.—"Gas stoves or radiators." No. 13,075.

MAIN'S NEW FOLDER IS READY.



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SHOW-ROOMS AND BRANCHES: 25, PRINCES STREET, OXFORD CIRCUS, W.; 82, Gordon Street, GLASGOW; 83, Old Market Street, BRISTOL; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

The Grangemouth Gas Commissioners have increased the price of gas from 4s. 7d. to 5s. 5d. per 1000 c.ft.

The Coroner's Jury returned a verdict of "Wilful murder and suicide," at an inquest on the bodies of Patrick Clearey and his daughter, who were found dead with the room full of gas. The windows, fire-place, and all crevices were fastened up with fresh putty.

The accounts to be submitted at Thursday's meeting of the Alliance and Dublin Consumers' Gas Company contain an item showing that an amount was received last half year of £7605 as "cash compensation awarded by the Government in respect to losses by fire and damage to property during the Sinn Fein disturbances in April-May, 1916."

A tablet has been placed in the Tiverton Gas-Works, recording the fact that the works were bought by the Town Council in 1896, and that the first Chairman of the Lighting Committee was the late Alderman John Thorne, J.P. It was largely due to his ability and devotion to public duty that during his twenty years' chairmanship the loan for the purchase and improved equipment of the works was repaid out of the profits. At the unveiling, it was declared that Mr. Thorne's services in initiating and carrying through the purchase of the undertaking, and his part in the management and improvement of the works, were services which would never be forgotten in the town.

The Directors of the Bentham Gas Company have notified consumers that as from the middle of this month there will be a temporary increase in the price of gas of 5d. per 1000 c.ft.

A verdict of "Suicide while of unsound mind" was returned last week, at an inquest in Leeds on the body of Eleanor Longbottom, who died from gas poisoning. She had been worried over her work and depressed. She was found in bed unconscious, with a piece of flexible tube attached to the gas-bracket, the other end lying on her chest.

NEWSPAPERS FOR NEUTRAL COUNTRIES.

The Secretary of the War Office has issued the following order:

The public are informed that newspapers and other printed publications will not be sent to Neutral Countries unless they are posted direct from the office of publishers or newsagents who have obtained permission from the War Office for this purpose. Persons desiring to send newspapers, &c., to Neutral Countries should, therefore, give their orders for execution to publishers or newsagents who have obtained such permission.

The Publisher of the "JOURNAL" has obtained the required permission of the War Office; and he will, on receipt of instructions, forward copies direct from the office to any neutral country.

STOCK MARKET REPORT.

The Stock Exchange has had a rather humdrum sort of week. A good feature, however, was that from a quiet and rather shifty opening day things very slowly but steadily improved in tone until on Friday the news of Sir D. Haig's great push on the Ypres front arrived and brightened up everything at the close.

The gilt-edged market was rather uneven. Home Government issues were handicapped by uncertainty as to the country's financial intentions in the immediate future; but the War Loan maintained steadiness. Home Rails had a better time, feeling more hopeful as to probable *post-bellum* conditions.

The Foreign Market was stronger. In addition to Russians, there was firmness in French, Scandinavian, Chinese, and Japanese. Argentines were a little better, and South Africans made some advance. In Miscellaneous, Rubber, Iron and Steel, and Textiles were in demand, Oil made some recovery, and Breweries attracted notice anew.

Business in the Gas Market was more animated than it had been for a long time past, and showed quite a big aggregate of transactions. A large share of these was in Primitivas, which had a renewed outburst of popularity—especially the ordinary shares, which slightly advanced in quotation. Imperial Continental, with a closing mark of 88, improved 2 points, and the debenture stock did the same. Some prices were hard to follow—*e.g.*, jumps from 85 to 89 and from 93 to 100, without change of quotation. But the true inwardness of bargains is not public property. The Money Market was firm.

Bargains done for cash during the week were as follows: On Monday, British debenture 68, Commercial 4 p.ct. 70½, Continental Union 39½, Gas Light ordinary 71, 71⅛, 71¼, 71½, 71⅝, 72, ditto maximum 57½, ditto debenture 56, 56½, Imperial Continental 86, 87, ditto debenture 65 7/16, 65½, Primitiva 42s. 6d., 43s. 9d., 44s. 4½d., 45s., 45s. 7½d., 46s. 3d., ditto preference 61s. 3d., 62s. 6d., 63s. 9d., South Metropolitan 72, 73⅛, 73⅜, ditto preference 95¼, 95½. On Tuesday, Brentford "B" 78, Gas Light ordinary 71⅛, 71½, 71⅝, 72, Imperial Continental 86½, Primitiva 46s. 3d., South Metropolitan preference 95¼, 95⅜, South Suburban 74½, 75½, Southampton 76¼. On Wednesday, Cape Town 60s., Commercial 4 p.ct. 70½, ditto 3½ p.ct. 64½, European 11, Gas Light ordinary 71½, 72, ditto preference 71, ditto debenture 56, 56½, 56⅝, 56⅞, 57, Imperial Continental 86½, 86⅞, 87, 87½, Primitiva 48s. 9d., ditto preference 62s. 6d., South Metropolitan 73, 73½, Southampton 76¼, Wimbledon 85, 85½. On Thursday, Bombay 5 7/16, British debentures (Hull) 66, 66½, ditto (Norwich) 66, 66½, ditto (Potteries) 66, 66½, Cape Town 60s., 60s. 7½d., ditto preference 6 13/16, 6⅞, Commercial 4 p.ct. 70½, European 11, 11 1/16, Gas Light ordinary 70½, 71, 71¼, 71½, ditto debenture 56, 56 5/16, 56½, 56⅝, Imperial Continental 86⅞, 87, 87½, Metropolitan of Melbourne 93, 100, Primitiva 46s. 3d., 46s. 10½d., 47s., 47s. 6d., 48s. 1½d., ditto preference 65s., South Metropolitan 73, 73½, Southampton 76, 76¼. On Friday, European 10⅞, 11⅛, Gas Light ordinary 70½, ditto preference 70⅝, 71, 71¼, Imperial Continental 86¾, 88, ditto debenture 65¼, Primitiva 46s., 46s. 3d., 46s. 10½d., 47s. 3d., 47s. 6d., ditto preference 63s. 9d., South Metropolitan 73½, ditto preference 94⅞, 95, 95¼, South Suburban debenture 87½, Southampton 75¾, 76, Wimbledon 89.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Share.	When ex-Dividend.	Prev. Div. or Div. & Bonus. p.c.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	57—62	..
1,551,868	,,	April 8	2½	5¼%	Alliance & Dublin Ord.	59—64	50—55	..
874,000	,,	July 10	4	4%	Do. 4 p.c. Deb.	76—79	57—62	..
280,000	5	April 29	7½	4/6	Bombay, Ltd.	5⅞—6⅛	5—5½	5 1/16
50,000	10	Feb. 26	16	14%	Bournemouth Gas and Water (10 p.c. B 7 p.c. Pref. 6 p.c. 4 p.c. Deb.)	29—30	23—25	..
383,110	10	,,	7	7%		15—15½	10½—11	..
115,000	10	,,	6	6/-		13½—14	9—9½	..
159,740	—	—	—	4%		..	69—71	..
992,045	Stk.	Feb. 26	14	5 1/16%	Brentford A Consolid.	261—266	79—83	..
734,920	,,	,,	11	4¼%	Do. B New	204—209	76—79	78
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	81—86	..
221,400	,,	June 11	4	4%	Do. 4 p.c. Deb.	91—93	65—67	..
217,880	,,	Feb. 26	11	10%	Brighton & Hove Orig.	208—213	145—150*	..
244,200	,,	,,	8	7%	Do. A Ord. Stk.	154—159	98—103*	..
530,000	20	Mar. 26	12½	22/6	British	44—45	33—34	..
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88—90	68—70	68
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	53—56	..
100,000	10	—	—	—	Cape Town & Dis., Ltd.	1½—2½	3—3½	60/—60/7½
100,000	10	—	—	4½%	Do. 4½ p.c. Pref.	4—6	6½—7½	6½—6⅞
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	60—65	..
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	78—79	..
1,513,280	,,	Feb. 12	5/9/4	44/-	Commercial 4 p.c. Stk.	106—108	70—72	70½—71
660,000	,,	,,	5½	40/-	Do. 3½ p.c. do.	103—105	64—66	64½
475,000	,,	June 11	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	51—53	..
800,000	,,	,,	4	—	Continental Union Ltd.	76—79	39—41	39½
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	61—63	..
278,400	—	—	—	11½%	Croydon B and C 7 p.c.	..	165—175	..
—	—	—	—	10%	Do. E	..	..	..
492,370	Stk.	—	6	5½%	Derby Con. Stk.	123—125	95—100	..
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	80—83	..
1,002,180	10	July 29	10	5/0	European, Ltd.	17½—18	10½—11½	10¼—11¼
16,318,480	Stk.	Feb. 10	4/17/4	37/4	Gas Light and Coke (4 p.c. Ord. 3½ p.c. max. 4 p.c. Con. Pref. 3 p.c. Con. Deb. 10 p.c. Bonds)	98—102	70—72	70½—72
2,600,000	,,	,,	3½	3½%		76—79	56—58	57½
4,062,235	,,	,,	4	4%		96—99	70—72	70½—71½
4,674,850	,,	June 11	3	3%		72½—74½	55—57	56—57
130,000	,,	,,	10	10%		..	..	..
258,740	,,	Mar. 12	5	3½%	Hastings & St. L. 3½ p.c.	87—89	48—53*	..
70,000	10	April 29	11	6%	Hongkong & China, Ltd.	16½—16⅞	7½—8½	..
86,600	—	—	—	9%	Hornsey 7 p.c.	..	115—125*	..
131,000	Stk.	Mar. 12	7⅞	7%	Ilford A and C.	151—154	92—97*	..
65,780	,,	,,	6⅛	5½%	Do. B	115—118	72—77*	..
65,500	,,	June 26	4	4%	Do. 4 p.c. Deb.	92—94	65—68	..
4,940,000	,,	May 14	9	4½%	Imperial Continental	150—160	85—90	86—88
1,235,000	,,	Feb. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	65—67	65 7/16—65½
235,242	,,	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	82—87*	..
2,498,905	,,	Feb. 26	10	5%	Liverpool 5 p.c. Ord. A	211—213	81—82	..
					B	146—148		
306,068	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	70—72	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4⅛—4⅜	3¾—4	..
250,000	100	April 1	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99—101	88—98	93—100
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½—12	7⅞—8½	..
1,875,892	Stk.	July 29	4½	4½%	Newcastle&Gateh'd Con.	98½—99½	71—72	..
529,705	,,	June 26	3½	3½%	Do. 3½ p.c. Deb.	82—83	61—63	..
55,940	10	Feb. 26	7/14/0	7%	North Middlesex 7 p.c.	14—15	9½—10½*	..
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	104—106	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7⅞	2—3	..
60,000	50	Feb. 26	13	12%	Portsea, Island B	128—131	83—88	..
100,000	50	,,	12	11%	Do. C	118—121	73—78	..
52,000	50	,,	10	9%	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5⅛—6	3½—3¾	42/6—48/0
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref.	4⅜—5	3 1/16—3 5/16	61/3—65/-
521,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91—93	78—80	..
—	—	—	—	4%	Do. 1911	..	..	..
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	86—87	59—64	..
150,000	10	May 14	6	6/-	San Paulo (6 p.c. Pref. 5 p.c. Deb.)	10½—11	7⅜—8½	..
125,000	50	July 1	5	5%		4⅞—49	40—42	..
135,000	Stk.	Mar. 12	10	10%	Sheffield A	223—224	..	..
209,984	,,	,,	10	10%	Do. B	222—224	180—184	..
528,500	,,	,,	10	10%	Do. C	220—222		
90,000	10	May 28	9	6/-	South African	10½—11½	8¼—9½	..
6,609,895	Stk.	Feb. 10	5/4/0	46/8	South Met. 4 p.c. Ord.	111—113	72—74	72—73⅜
—	—	—	—	—	Do. Pref.	—	—	94⅞—95½
1,895,445	,,	July 10	3	3%	Do. 3 p.c. Deb.	72½—74½	55—57	..
224,820	,,	Feb. 26	8½	7½%	South Shields Con. Stk.	157—159	137—139	..
952,795	,,	,,	6	4½%	S'th Suburb'n Ord. 5 p.c.	114—116	74—76	74⅞—75½
60,000	,,	,,	5	5%	Do. 5 p.c. Pref.	110—112	75—77	..
135,000	—	—	—	4½%	Do. West Kent	..	..	..
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	86—88	87½
647,740	,,	May 14	5	5%	Southampton Ord.	99—102	76—78	75¾—76½
120,000	,,	Feb. 12	7½	5½%	Tottenham District (A 5 p.c. B 3½ p.c. 4 p.c. Deb.)	135—138	92—97	..
782,275	,,	,,	6	4%		115—117	66—71	..
181,255	,,	June 26	4	4%		87—89	63—65	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	60—65	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max.	108½—109½	89—91	..
80,000	,,	Feb. 26	8⅜	7 2/6	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	151—156	112—117	..
255,636	,,	,,	6⅜	5 7/6	Do. B 3½ p.c.	129—134	97—99	..
108,075	,,	,,	5/17/3	5 0/9	Do. C 3½ p.c.	110—115	84—89	..
352,000	,,	,,	6⅜	5 1/3	Wimbledon 5 p.c.	117—122	85—90	85—89
98,000	,,	,,	6⅜	5 7/6	Epsom 5 p.c.	131—126	93—98	..
88,416	,,	June 26	3	3%	3 p.c. Deb. Stk.	66—69	50—53	..

* Ex. Div.